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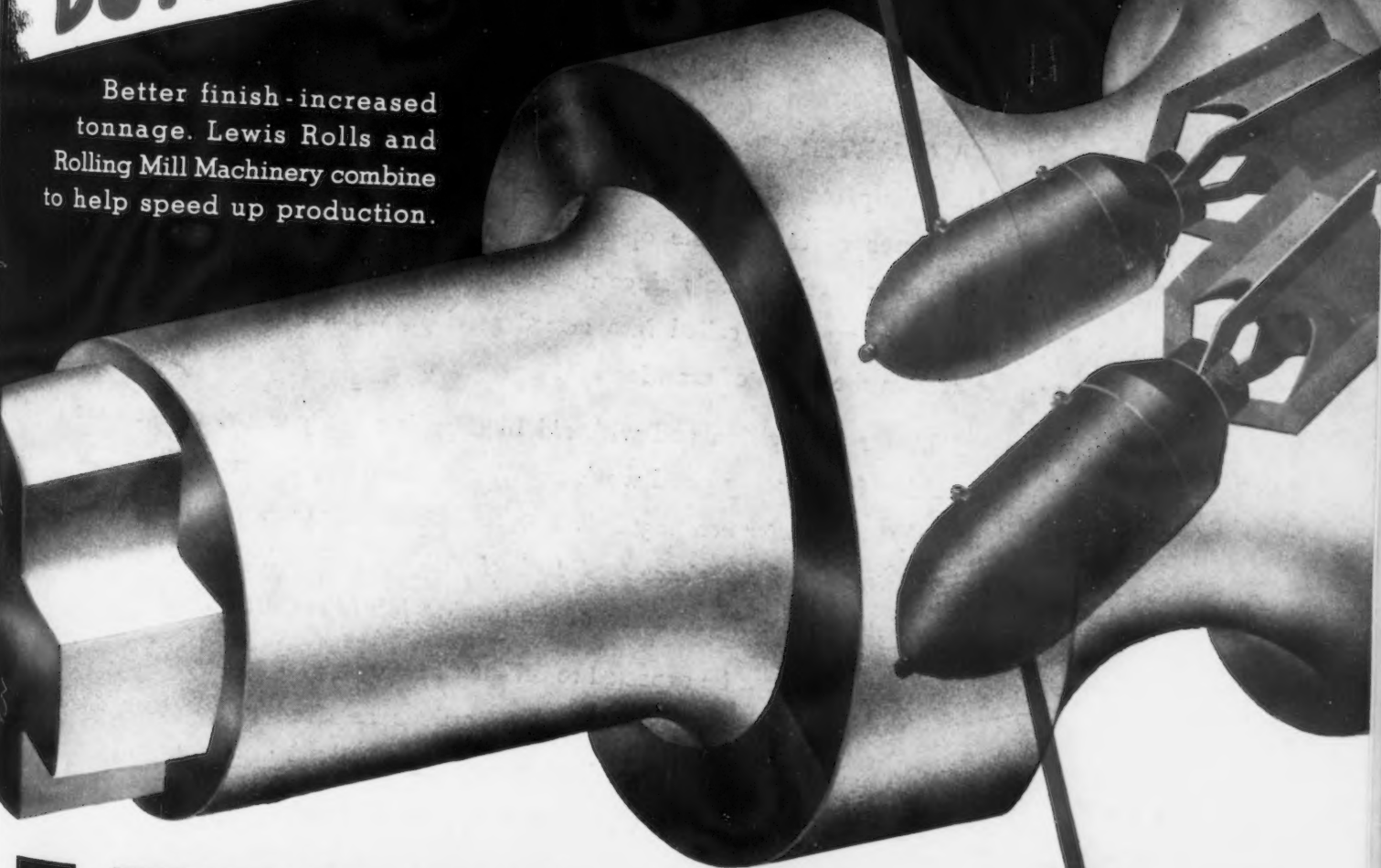
FEBRUARY 4, 1943

The

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FEBRUARY 4, 1943

VOL. 151, NO. 5



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The Common Denominator

IN arithmetic, many problems are solved by finding a common denominator among a group or groups of assorted numbers. War on a global scale does that very same thing except that the assorted groups are people and not digits.

The common denominator of war is the arrival of the nations involved in it at a common purpose. And that means the cancelling out of individual differences of opinion and of the conflicts of thought and action that detract from the common purpose of victory.

No nation can hope to be victorious in war unless that common denominator is found. And various nations go about finding it in various ways. These ways are as different as day is to night.

The Axis nations achieve it, under their fascistic philosophy, by compulsion. Germany has done it via the goosetstep, Japan through indoctrination of the god-emperor phantasy, Italy through the bull calf bellowing of a megalomaniac two-spot appropriately called the "duce."

In democratic countries where centralization of power has been avoided through national policy, the job is harder. Yet it can be done. Witness China.

China, today, is probably the most united nation of all the united nations. Yet before it was attacked by the "monkey men" it was probably the most disunited and with the least powerful central government. Its gigantic area was divided into sections and provinces with constantly shifting political boundary lines, variously controlled by conservatives, communists, bandit chiefs and what have you. No greater variety of aims, purposes, interests and ideas and no greater differences in ways of achieving them ever existed anywhere on earth. Yet today bandits and mandarins, peasants, paupers and merchant princes, communists and conservatives are working and fighting side by side with one common purpose.

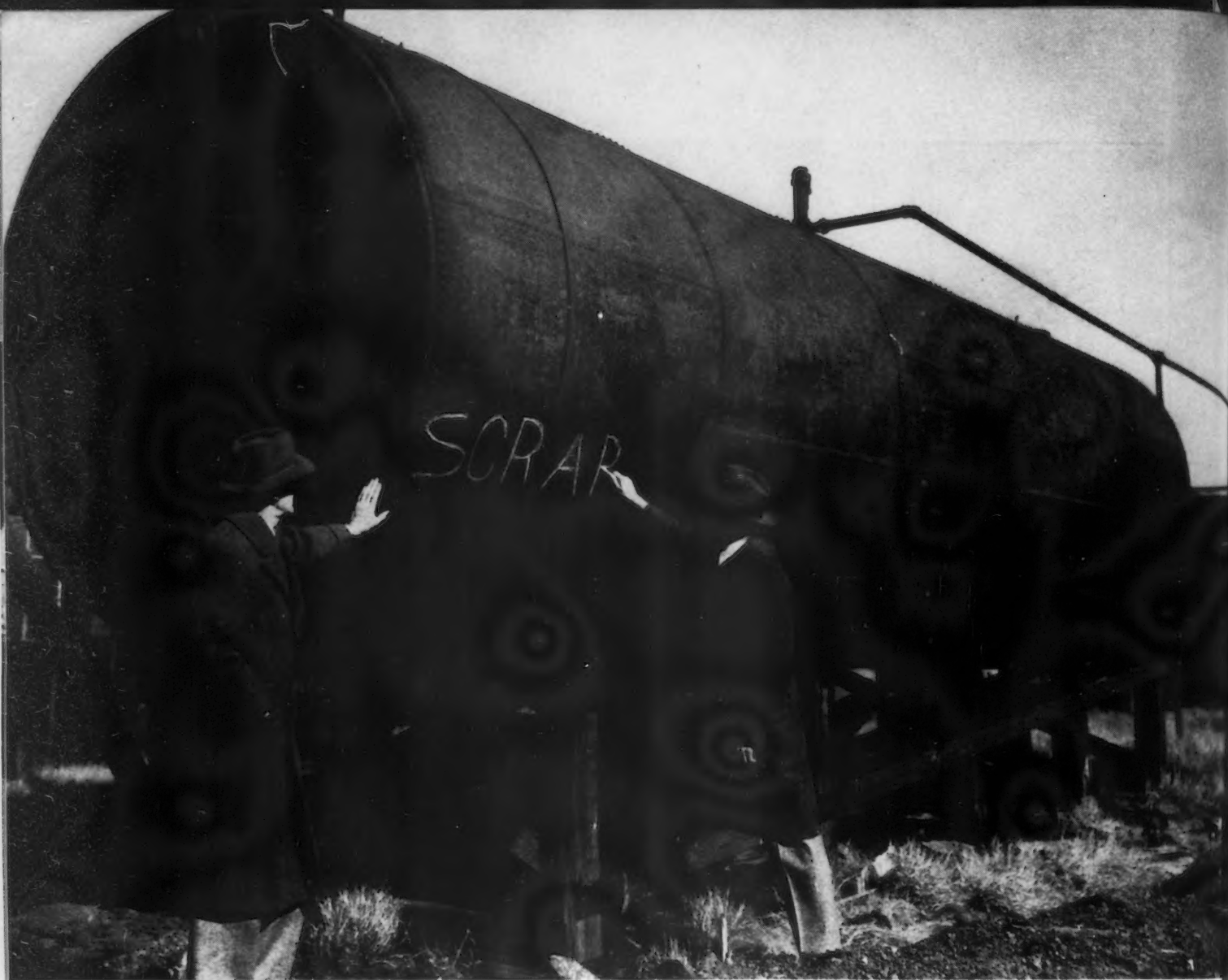
China has found its common denominator. It is not likely to lose it after the war, once having found it.

I think that there is a powerful object lesson in this for us of the United States of America. We too must find our common denominator not only in order to win the war but to win the peace to follow. Surely if China with its vastly greater differences in sectional and class interests and social strata can do it, we can too.

Today our chief remaining problem is to find the common denominator for capital, represented by management, and labor. They have so much more between them of common interest than they have of opposite purposes that this should not be insuperable. Unfortunately these differences have been and are magnified out of all proportion because of the selfish interests of reactionary employers, self seeking labor leaders and vote seeking politicians.

War has already done much to iron out these differences. But we can't expect war to do it all. It's a job to which every right thinker should put his shoulder now, for the sake of the America of tomorrow.

J. W. Van Dusen



"Scrap" orders Frank Baker, general purchasing agent of Pullman-Standard Manufacturing Co., on his tour with L. C. Reed, chairman of the Chicago district dormant scrap campaign.

Mark it SCRAP—Mr. President

● So long as this war lasts the problem of scrap supply will confront America's steel mills. That is why we are again appealing to you presidents of manufacturing companies to use all your influence and all your official authority to move the dormant and potential scrap that remains about your plants.

Yes, we know you have had scrap drives, that you have had diligent scrap committees at work for months. They have done a fine job. But after all is said and done their authority is limited. Many of the things that can and should be marked scrap, under today's standards

and necessities, are the very things which you, or other officials, may have designated only a few years ago as "standby," or "reserve." Maybe releasing some of this potential scrap is a matter of capital account. In any event it will require your countermand of old instructions, and orders from you to establish new company policies, so that surplus and unneeded machinery, spare parts, processed parts, etc., will reach steel mills as vitally needed scrap.

The next move is yours, Mr. President—mark it "scrap" today so our fighters will have the guns, the planes and the tanks they need to win.



*Dedicated
to Victory*

INLAND STEEL CO.

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GLASS GAGES

Sponsored by Ordnance Department

... Long in the vanguard of technical developments relating to inspection gages, the U. S. Ordnance Department is supplying the driving force behind the new program for substituting fixed gages made of glass for those made of critical tool steel. The accompanying data and illustrations were supplied through the courtesy of Lt.-Col. J. A. Stone of the Frankford Arsenal and T. J. Thompson of the Corning Glass Works, Corning, N. Y.

By F. J. OLIVER

Technical Editor, THE IRON AGE

GLASS gages for inspection work are definitely here. Based on six months' experience with such gages, it is predicted that eventually 50 per cent or more of all fixed steel gages used in ordnance work will be replaced by glass gages. New possibilities for the application of these gages are opening up so that the ultimate extension may be much more than 50 per cent.

The glass gage movement was fathered by Lt.-Col. J. A. Stone, recently in charge of the gage laboratory and now executive officer of the Frankford Arsenal. In his opinion, glass gages have demonstrated the following advantages over gages made from tool steel:

1. The thermal conductivity of glass is less than steel; therefore, heat transfer from the hands of the inspector will not be nearly as great as for steel and the effect on the gage dimensions appreciably less.

2. Glass, because of its relative fragility, will teach green inspectors to have respect for gages in their handling. In fact, observation of the careless manner in which inspectors handled gages was partly responsible for the initiation of the present glass gage program.

3. Fragility of glass is an advantage when considered in connection with other physical prop-

erties to be considered in detail later. A glass gage, if dropped on the floor, either survives dimensionally unchanged, or it is smashed to smithereens. A steel gage, if it strikes in a vital spot, may be sprung out of size and thus unwittingly be allowed to pass defective work thereafter. This is a very important point in the mind of Colonel Stone. It assures that only dimensionally accurate gages will remain in service.

4. When the component is very near the size of the gage, there is less tendency for the component to seize or gall in or around the gage. This is particularly noticeable when a steel plug gage is used to check a brass bore near the "Not Go" end of the size limit. In fact, glass has some anti-friction properties that makes it easier for a plug, for example, to enter a hole and has speeded up gaging by as much as 50 per cent. You get a sense of "feel" with a glass plug gage that greatly accelerates the fac-

tor of judgment on border-line holes. Often the "Not Go" end does not have to be used.

5. Glass is subject to scratching, but scratches on glass do not raise any burrs and thus change the effective size of the gage as occurs in steel gages. A glass plug gage with badly chipped edges will still function 100 per cent as a checking instrument. (Design modifications are now being made to offset the tendency to chip.)

6. Perspiration on the hands of inspectors has no corrosive effect on glass gages. Rust has ruined many a steel gage in storage and shipment, and juice from an orange eaten at the inspection bench at lunch time has occasionally etched steel gages beyond repair.

7. Glass appears to have abrasion resisting qualities equal to or better than steel in many gaging applications. (See tests below.)

8. Glass gages are considerably less expensive and require less

operator and machine hours to produce. New manufacturing techniques point to further reduction in finishing time and hence in costs, particularly where large quantities of gages are involved and mass production methods can be applied in the glass manufacturing plant.

9. Most important at this time is the saving of tool steel for other uses. Vital machine tool capacity is also released for other work.

10. Glass gages are easier to handle inasmuch as they are lighter than steel.

11. Glass gages afford visibil-

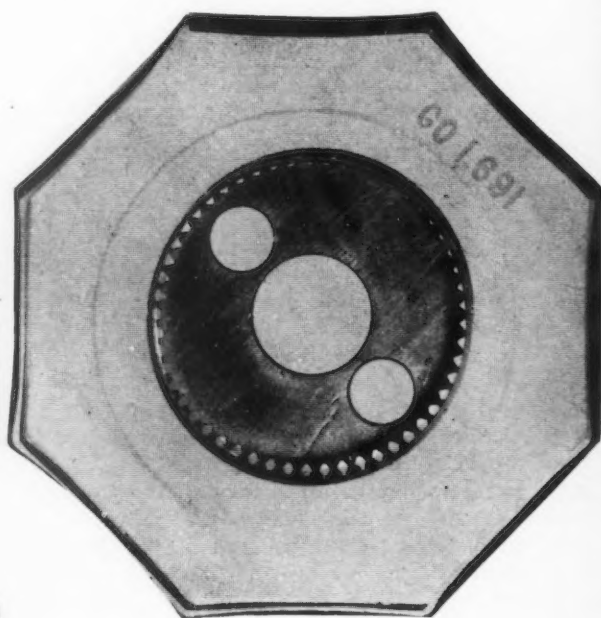
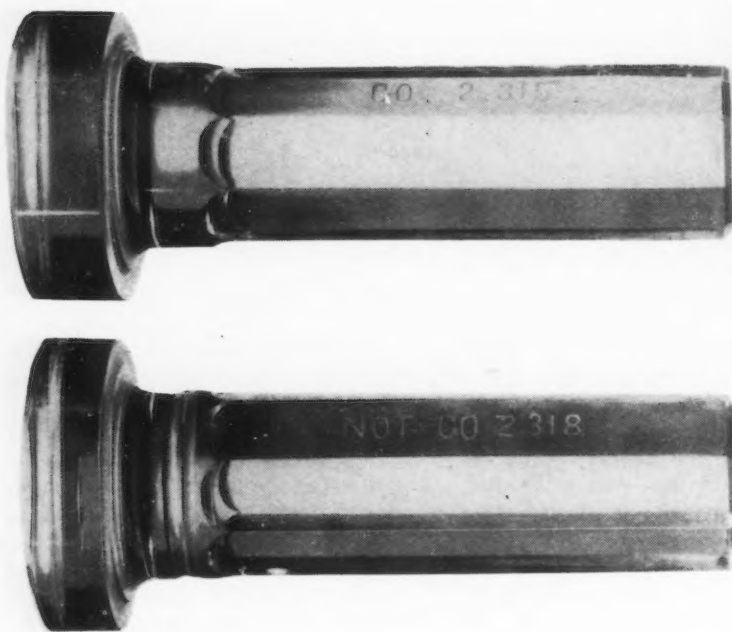
tion of the potential possibility of dimensional change in steel gages due to transference of body heat that caused Colonel Stone to order the first glass gage. Colonel Stone does not claim to be the originator of glass gages, but he is responsible for having introduced glass gages in ordnance manufacture last summer.

The first glass gage was a ring type, Fig. 1, made to measure the o.d. of a brass component which had a number of small teeth on the periphery. These teeth had been scratching and rapidly wearing steel ring gages. The glass substitute gage when last heard from had

Electrolimit comparator. it would have taken a few months to get delivery on a steel gage.

This gage was taken around to a number of ordnance contracting plants in several Ordnance Districts and put on the inspection lines. Some scratching of the bore took place, but it was not nearly as severe as on the corresponding steel ring gages. Thousands of pieces were checked without any noticeable wear in the glass gage. This convinced Colonel Stone of the feasibility of glass gages and he launched the present program with the encouragement of Col. John B. Rose, commanding officer of Frank-

FIG. 2—A pair of "Go" and "Not Go" plug gages made of glass for the Frankford Arsenal. Markings are put on by acid etching. It is also possible to photograph markings on the gage by the silk screen process. It is proposed that the "Not Go" end be given a red tinge.



ABOVE

FIG. 1—The first glass gage used for Ordnance inspection was a plain ring gage made from the base of a flint glass candlestick. The brass component is shown in the bore.

ity in inspection which is not always possible with steel.

12. Many greasings and degreasings are eliminated in the process of taking gages out of temporary storage, checking them in the laboratory, shipping them to the contracting plant and vice versa. Primarily this is an arsenal problem and encompasses also the problem of permanent storage of gages after the war. (See also paragraph 6.)

The advantage of low thermal conductivity is put at the head of the list because it was the realiza-

checked thousands of these brass parts without showing any appreciable signs of wear. It was made out of a hard flint glass by a glass novelty manufacturer, A. H. Heisey & Co., Newark, Ohio. The hexagonal perimeter of the gage takes its form from a glass candlestick base. The gaging bore was ground out in a heavy duty lathe, using a Dumore tool post grinder on the compound rest. Later the bore was carefully lapped to size. Despite the improvised set-up, the gage was made in a few hours and checked within 0.00005 in. of size on a P. & W.

ford Arsenal; and of Col. Harry B. Hambleton, Col. D. Allen Lenk and Lt. Col. William J. Darmody, Office of the Chief of Ordnance. Much of the detailed work has been carried on by Lt. Franklin Smith and Benjamin Patton of the Frankford Arsenal gage laboratory.

As the project stands at the beginning of 1943, the following types of gages are to be made available in glass:

1. Plug gages, $\frac{1}{4}$ in. diameter and over
 - a. Plain "Go" and "Not Go."
 - b. Double end plain plug.

2. Ring gages
 - a. Plain "Go" and "Not Go."
 - b. Twin rings.
 - c. Combination ring and snap.
3. Certain types of snap gages
4. Profile and position gages
5. Certain types of flush pin gages with pin size of $\frac{3}{8}$ in. and over (Yet to be tried out)

Chamber gages for measuring the entire profile of a complex shape like an artillery cartridge case are a future possibility, but as yet none has been made. They show great promise over steel gages. Their use is expected to revolutionize chamber gage practice.

Although $\frac{1}{4}$ in. is set as the minimum practical limit for plug gages, some glass makers believe that from the point of view of mechanical strength, $\frac{1}{2}$ in. is a more practical limit. The upper limit on size is about 3 in., but it might be entirely possible to exceed this by the use of tubing for hollow blown shapes. This will be a subsequent refinement. From present indications it appears that a substantial portion of the gages used in large volumes would fall in the range between $\frac{1}{2}$ and $2\frac{1}{2}$ in.

At first the basic manipulating process by which glass plug gages were formed made it most economical to make the complete gage in one piece, whether it be a single or double end gage. (See Figs. 2 and 3.) Most recent information, however, would indicate that separate glass plugs inserted into plastic handles will be more satisfactory. Some of the first handles of dumb-bell type plug gages had round handles. In the future, these will be made hexagonal in shape so that they can readily be clamped in fixed set-ups. This is frequently done, for example, in gaging the mouth bore of large artillery cartridge cases where it requires two hands to manipulate the case. For this kind of a set-up, single-end plugs must obviously be used. Incidentally, such an arrangement is a good insurance against dropping the gage, though a rigid holder is disadvantageous from the point of view of chipping.

The size range of ring gages of immediate interest is between $\frac{1}{4}$ and 4 in. i.d. Thickness of the blank will probably be $\frac{1}{2}$ to $\frac{5}{8}$ in. in order to obtain the strength against accidental shock and breakage. (See Fig. 4.) In the event it is possible to employ the "precision shrinking" process, to be described later, for

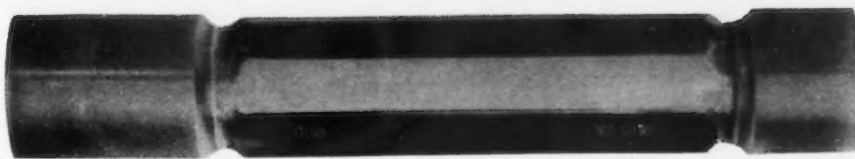


FIG. 3—Early form of double end plain plug gages. Later designs will have rounded pilots at the ends to minimize chipping. (See Fig. 9.)

forming the bore or hole, it is essential to provide retaining frames, Fig. 5, for insertion of the annular gage whose wall thickness would probably be not more than $\frac{1}{4}$ in. Such frames can be made out of wood or plastic or other non-critical materials. The overall cost of such a gage will probably be very low.

Snap gages can best be made of glass in sizes ranging from $\frac{1}{2}$ to 5 in. between the jaws, particularly for gages with relatively short legs ($\frac{1}{2}$ to 3 in.). Section thickness will have to be great enough to provide reasonable mechanical strength and resistance to impact. The combination ring and snap gage shown in Fig. 6, for example, has a thickness of $\frac{5}{8}$ in. Gages with jaw openings between 3 and 5 in. can be strengthened by a wood frame. As mentioned before, glass has one notable advantage as a material of construction for snap gages: If dropped, glass snap gages can not be sprung. They either survive dimensionally unchanged or break.

Profile gages, such as the one shown in Fig. 7, can be molded in dies or ground directly out of plate glass. Use of a rounded wood frame cemented to the gage is necessary to protect such a gage from chipping and breakage.

Thread gages made of glass are considered impracticable. Although it is entirely possible to mold coarse threaded sections in glass, the resultant structure is mechanically

weak and subject to chipping because of concentration of stresses in thin sections and edges.

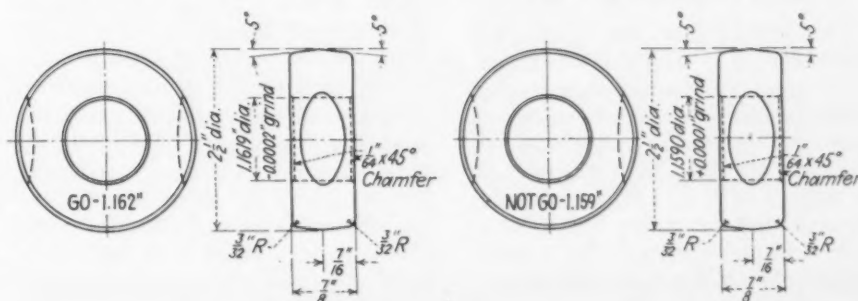
How Glass Is Molded

At present, the font molding technique of glass manipulation appears best suited to produce accurately the odd shapes and heavy sections required for gage blanks. The molds proper are open-and-shut or "book-type" and fitted with a cup or font to receive the molten gob of glass. Compressed air or a mechanical plunger then forces the glass through a connecting channel or gate into the mold cavity in a manner similar to injection molding of plastics. Upon removal from the mold the overflow or "moil" is cracked off the blank.

Ordinarily an o.d. variation in the glass blank of about $\frac{1}{32}$ in. would be expected, but it would be possible to attain closer tolerance ranges by special attention during the molding operation, accurate finishing of mold insert, or by special selection after the blanks are molded. Such font molding will result in slight fins diametrically opposed at the mold seams, since the die is split. Such molding could be used for the production of blanks from which ring, plug, snap and profile gages would be made.

One or more of other molding techniques might have certain advantages for production of some of the shapes referred to. For example, it might be possible to attain

FIG. 4—Glass ring gages are made fairly thick to reduce breakage. It is proposed that a small hole be molded in the body for looping a holding string through it.



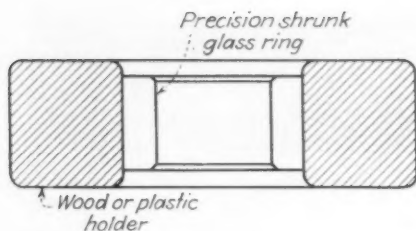


FIG. 5—Proposed design of a ring gage made from tubing precision shrunk around an accurate alloy steel mandrel. Only a few "tenths" need be allowed for lapping to final size. Such gages can be made for a fraction of the cost of steel ring gages.

greater accuracy of the ends of plug gages by blowing into specially designed molds of special composition.

For ring gages there is some possibility that the process known as "precision shrinking" can be employed to subsequently reduce the amount of finishing required. This process basically comprises the heating of a glass cylinder mounted on a special alloy mandrel of corresponding size until the glass softens. By applying vacuum or pressure, the glass is forced down on the mandrel and reproduces its surface finish, contour and dimensions faithfully. This precision shrinking process will only be applicable in those instances where the coefficient of expansion of the glass and the metal mandrel differ widely enough to permit the mandrel to shrink away from the internal bore of the glass tube when both glass and mandrel are cooled.

For certain sizes and types of plug gages, most probably the larger sizes, of 3 in. o.d. or greater, it might be considerably more economical to use machine drawn glass tubing as the basic material. Such tubing can be drawn and specially selected to rather precise o.d. tolerances, and can be made with walls of rather substantial thickness.

Physical Properties of Glass

Glass differs from metals and alloys primarily in that it is composed of oxides of metals rather than the metals themselves. Also it is amorphous rather than crystalline in structure, and this largely accounts for its relatively low tensile strength and friability. The ultimate tensile strength of glass ranges between 5 and 15,000 lb. per

sq. in., whereas its strength in compression is enormous—at least 100,000 lb. or more. Consequently, it is advisable when designing gages made from glass to utilize compressive strength to the utmost, and in those instances where tensile forces come into play, the use of

be protected from chipping by ample beveling or rounding of edges. Much of such beveling or rounding can be formed in the mold, thus shortening the time required for grinding. It should be appreciated, however, that slight chipping at the outer edges of the gaging surface

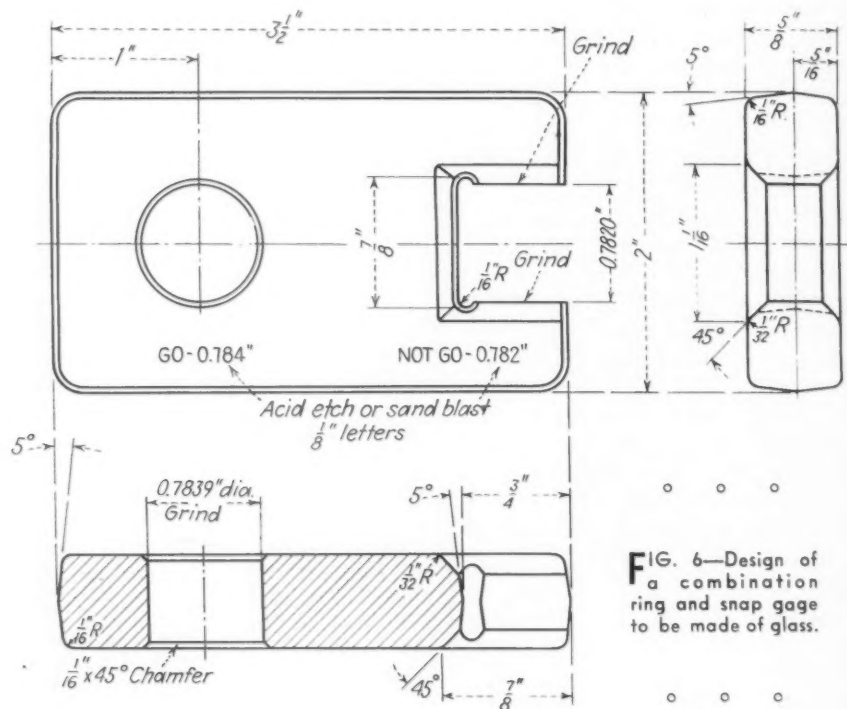


FIG. 6—Design of a combination ring and snap gage to be made of glass.

heavier sections can be made to overcome relatively low tensile strength.

Because of its low tensile strength and because glass does not cold flow, its impact resistance is much less than that of metal, but by eliminating sharp corners or by use of heavy sections, impact resistance (or resistance to dropping) can be greatly improved. It might be possible to further safeguard gages from breakage by mounting them in simple frames of wood or other resilient materials, also by use of soft resilient flooring at the gaging bench. Glass dropped onto wood floors, for example, has a much greater chance of survival than when dropped onto concrete or steel. Fiber board or Celotex tops can be used on the gaging benches.

When properly designed and used with reasonable care, there need be little chipping as a result of gaging operations. Plug gages, for example, should include a short pilot with rounded or beveled contour; similarly, the holes in ring gages can

does not impair the gaging function.

Although glass is relatively brittle, it is highly elastic and has practically a straight line stress-strain curve up to the point of failure. Being non-crystalline, it is remarkably resistant to cold deformation or permanent set such as takes place in metal due to slippage at places of weakness in crystals. Glass has a wide range of moduli of elasticity, varying from 5 to 14 x 10⁶ lb. per sq. in., depending upon composition. As a spring material it has very low hysteresis loss and always returns to its original shape, which is a decided advantage as a gage material.

To the average person, one of the first questions that arises in reference to glass gages is that of fragility. As one commentator facetiously put it: "One advantage of glass gages is that if you drop one, at least you don't have to pick it up." Actually, some of the newer glasses are much more shock proof than commonly believed.

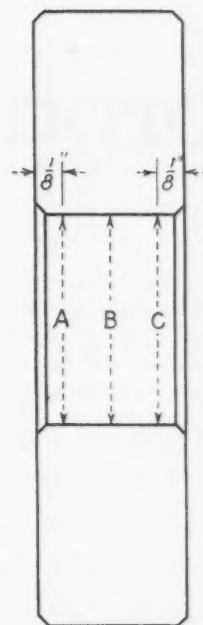
Glass always fails in tension since its tensile strength is only about 1/10th of its compressive strength. Furthermore, like any other material, it is weakest at the surface. In view of this fact, to improve impact resistance, use can probably be made of a tempering process by which a compressive envelope is set up in the glass to offset tensile stresses that might cause fracture from chipping. Tempered glass is produced by heating the object up to the plastic range, then plunging it in a chilling medium long enough to set the outer skin. Then the piece is withdrawn and the inner core allowed to cool slowly. Since no cold plastic deformation can take place, the inner material tends to shrink away from the outer ring, which is thereby preloaded in compression. Before any tension stresses, such as occur in bending, can become effective on the

This tempering process, on the one hand, and the precision shrinking process for producing female type gages on the other, will each be important factors in the future development and refinement of glass gages.

There are also great variations in the hardness or wear resistance of glass compositions. Because of friability and lack of cold flow, their hardness cannot be measured by Brinell or Rockwell readings. A rough comparison is afforded by Mohs scale of mineral hardness, in which quartz is 7 and diamond is 10. On this scale glass ranges between 6 and 7. The boro-silicate (heat resisting Pyrex) glasses with their very high silica content are among the hardest and most abrasion resistant glass commercially available. In fact, they are almost three times as resistant to sand-blasting as ordinary window or bottle glass made of soda-lime composition. However, boro-silicate glass has only 1/3 to 1/4 of the thermal expansion of most metals, including carbon steel. Hence they are not usable for gages without modification.

The linear coefficient of expansion of a standard boro-silicate formula is 0.0000018 in. per in. per deg. F. as compared with 0.0000060 for carbon steel. The Ordnance Department's tentative specification for glass gages calls for a coefficient of expansion of between 40 and 60 x 10⁻⁷ in.

Corning is at present developing a special glass composition having



Initial diameters
A 1.0262
B 1.0261-2
C 1.0265

FIG. 8—Sectional view of a glass ring gage of 1.026, + 0.000 — 0.0006 in. nominal size, which was tested with a steel plug in a shaper set-up. The reference letters indicate the three points at which the diameter was measured for wear. The diameters at start of test are given.

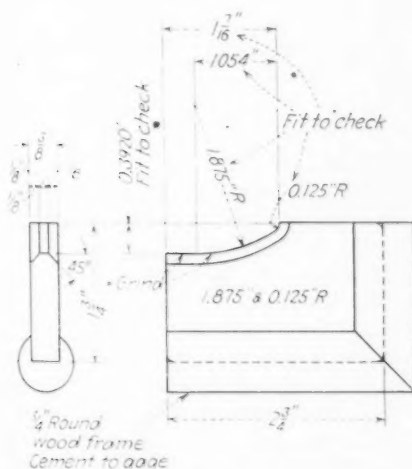
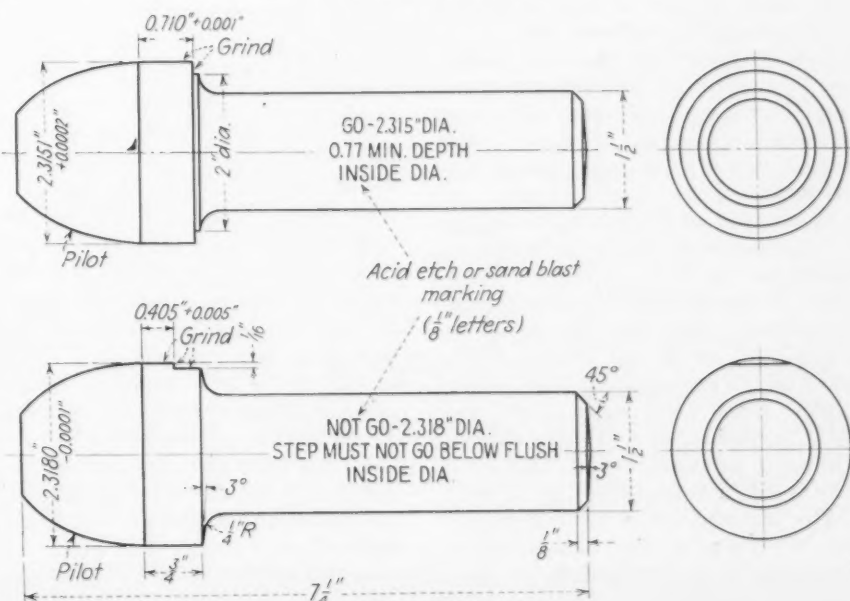


FIG. 7—Profile gage for a shell nose. Such a gage could be ground from a molded glass blank or from a piece of plate glass.

the best combination of properties such as hardness, abrasion resistance, coefficient of expansion, etc. (CONTINUED ON PAGE 98)

FIG. 9—Redesigned plain plug gage with rounded pilot to minimize chipping of gage end.



Boron Steels Increasingly

THE conservation of strategic materials in the manufacture of special quality alloy steels has caused a phenomenal rise in the use of boron as an intensifier and at the same time has placed this element in a position where it is fully entitled to more than an Army-Navy "E" award.

This element in which the metallurgical fraternity has had but a passing interest, has blossomed forth as an important partial substitute for a number of strategic elements. Its use in cast iron predates its adoption by the steel industry, but it has been found that boron in the amount of 0.003 maximum, when used for obtaining certain physical properties, can substitute for 1 per cent nickel, 30 points of chromium, 20 points of manganese, 12 points of vanadium, or 10 points of molybdenum.

The effect of boron is to increase the depth of hardness of a heat treated piece of steel and with this increase in hardenability, an increase in ultimate strength and elastic limit of the steel is also obtained. It is possible to obtain an increase in ductility of steel when the tensile and ultimate strengths are maintained similar to that of the untreated steel.

In cast iron, it has been found that the addition of from 0.02 to 0.12 boron has the effect of increasing the hardness, refining the grain, and increasing the wearing qualities of the iron. Likewise, substitution for some of the commonly used elements is possible by making judicious use of boron and balancing the mixture.

A method of adding boron alloy for maximum recovery in the making of cast iron is to add it to the spout as the liquid metal runs into the ladle. In the case of steel, ferroboron may be added in the ladle after all other additions have been made. Some steel companies now split the addition into five parts, adding it as the ladle fills and getting it all in before the slag starts.

The story of boron as it involves the research of the Molybdenum Corp. has been interesting. It was

natural to delve into the possibilities of further increasing the use of boron or boron alloys since the company had for some time made various boron products. Metallurgical literature contains only a meager amount of information and patent literature was also found to be of little use in exploring additional possibilities of boron.

Since boron has always been a high priced material, one of the things that it has been necessary to produce is an alloy which would readily dissolve and which would permit a high recovery of boron when dissolved in the ferrous metal. After investigating a great number of alloys, the company finally developed the alloy which is now in regular production, namely 1½ per cent carbon, 11 per cent boron, 3 per cent silicon, balance essentially iron. It has been found that this alloy has a low melting point, that it readily dissolves in liquid cast iron and steel and that the recovery of boron is approximately 85 to 90 per cent.

Some of the difficulties that might have been apprehended "never happened." For example, one of the hardest constituents known is boron carbide, and were this to be dispersed throughout the steel, machining difficulty would be encountered. But, since boron carbide is formed at a very high temperature and under conditions not usually encountered in ordinary steel making practice, it is not likely that this would occur unless the form from which boron is introduced favored this. The question was, did it? Up to now boron carbide has not been identified in any ferrous material to which the company's ferroboron has been added, and it is quite justifiable to say that it is non-existent as a result of the ferroboron addition. Boron carbide, when present, can be readily identified. When boron carbide itself has been added to certain tool steels, it is not dissolved in the steel but retains its identity as boron carbide even after the steel has been melted, rolled and shaped into

its final form. In no way has it combined with the other elements in the steel.

Since the presence of boron carbide was not detected, the next step was to attempt to identify the form in which boron appears in steel, and at the same time, to account for its extra strength endowing properties. It became necessary to delve into the phase diagram of boron, carbon and iron. This investigation was greatly aided by some research work performed by Dr. D. S. Clark of the California Institute of Technology; by subsequent work at the Molybdenum Corp. a great amount of the data presented in his thesis has been substantiated. By producing a large number of alloys and recognizing a new constituent, tracing it through various additions to steel, it is believed that the new constituent is $\text{Fe}_3\text{B}-\text{Fe}_3\text{C}$, iron boride—iron carbide.

First efforts were in the manufacture of cast iron where it was known that a hard alloy consisting of nickel and boron had been used with apparently very satisfactory results. It was thought that the physical properties of cast iron could be increased and, therefore, work was initiated with a roll manufacturer, Mackintosh-Hemphill Co., Pittsburgh. Adding known amounts of boron to cast iron, its effects were noted. First perceived was that an iron which already had a large percentage of hardenability was turned completely white in amounts of from 0.12 boron and up. It was in the amounts of less than 0.12 that the greatest interest was attracted since it was desired to know what happened to the iron which contained boron but which was not sufficiently strong in carbide formation properties to produce a white iron. After a number of experiments, it was shown that the addition of 0.05 boron to these roll-type analysis irons increased the physical properties in such a way as to give longer life when the rolls were in use in the mill. Accordingly, the addition of 0.05 per cent was recommended, and it has been shown that this amount satisfacto-

Favored

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rily effects a finer grained structure, a slight increase in the hardness and a reduction of the columnar structure which is generally evident in the chilled cast iron roll structures, especially when a large mass is involved.

Subsequent work has shown that positive results may be obtained in this type of iron down to 0.02 per cent and that in higher silicon irons and others with low percentage of hardening elements in their composition, as much as 0.19 boron may be gainfully used. Today a very good percentage of cast iron rolls contains boron, and it has been found possible to reduce some of the other alloys to a small extent by only a slight increase in the percentage of boron. Good practice now dictates that for each point of boron added to the cast iron the amount of silicon should be increased by two points, and that when the boron increase is up to 0.10 per cent the silicon replacement should be figured at three points for each point of boron beyond 0.10 per cent.

The melting of cast iron scrap containing boron at first represented a problem because a satisfactory method to determine the amount of boron that was retained when remelting the scrap was not available. However, it is now known that about a 50 per cent recovery of the boron in the cast iron is obtained when remelting. The type of melting furnace has some bearing on the boron recovery when remelting scrap, but for the average cupola or air furnace type the 50 per cent recovery seems approximately correct.

The method of approach in the investigation of boron as applied to steel was essentially the same as that of cast iron in that the boron content was divided in tenths of a per cent, only to find that the steel was not rollable. The boron content was then divided into one-hundredths of a per cent and again it was found that the steel with as little as 0.01 boron would not roll satisfactorily. It was decided to find out just how small a quantity

... Knowledge of boron's influence in ferrous metallurgy is expanding rapidly, and this element has already lessened the pressure on certain strategic elements. Herein, the author describes many of the development stages in the utilization of boron in carbon and alloy steels, and sets forth the present status of the technique. For additional information on boron, see THE IRON AGE, issue of Nov. 19, 1942.

could be put into steel and make it rollable.

After making various heats of steel, adding from 0.001 up to 0.010 per cent boron, it was found that the steel exhibited hot-short properties with as little as 0.007 per cent boron added. Idle curiosity prompted the desire to see if any good could be derived from 0 to 0.007 per cent, and as is shown, approximately from 0.0025 to 0.0030 per cent gave the best results. In this range a greater depth of hardenability was achieved. Also, it was noted that there was no change in the properties of the steel unless it were quenched and drawn and that a greater response to the effect of boron was shown under low drawing temperature rather than the high.

Since there were no accurate methods available to analyze for such small amounts of boron, practically all of the early work on an added amount of boron was carried out while not knowing exactly how much was left in the steel or whether it was uniformly distributed. Within the past six months the chemical department of the Campbell works of Youngstown Sheet & Tube Co., Youngstown, under the direction of D. A. Russell, chief chemist, has worked out a successful chemical colorimetric method which is sufficiently accurate for control work. Also, J. A. Berger, research metallurgist, Molybdenum Corp. of America, has been instrumental in working out a successful spectrographic method

for the determination of boron in these small percentages.

Using these methods of determination for boron, it was learned that the optimum amount of boron for best results is 0.0025 per cent contained boron. This figure was arrived at after testing many heats of steel made in both electric and open hearth furnaces.

The important point in connection with boron additions to steel is that extra properties are obtained through heat treatment. This heat treatment is primarily a liquid quench and a draw, although some results have been obtained from air quenching when sufficient other hardening elements were present to aid in the penetration of hardness. The facts of interest are that boron will increase the penetration of hardness and by so doing, automatically increases the elastic limit and the ultimate strength of the steel. Little or no change will be noted in the ductility unless it has been found desirable to maintain the ultimate strength at a level equal to that of an untreated steel, and when this is desired an increase in the ductility can be expected from a boron treated steel.

After discovering that boron would impart a greater penetration of hardness, it became necessary to develop methods which were mainly of control. It was soon noticed that the addition of boron to a steel gave a coarser grain size than one without, but it was also found that some of the well known grain refining elements such as aluminum, titan-

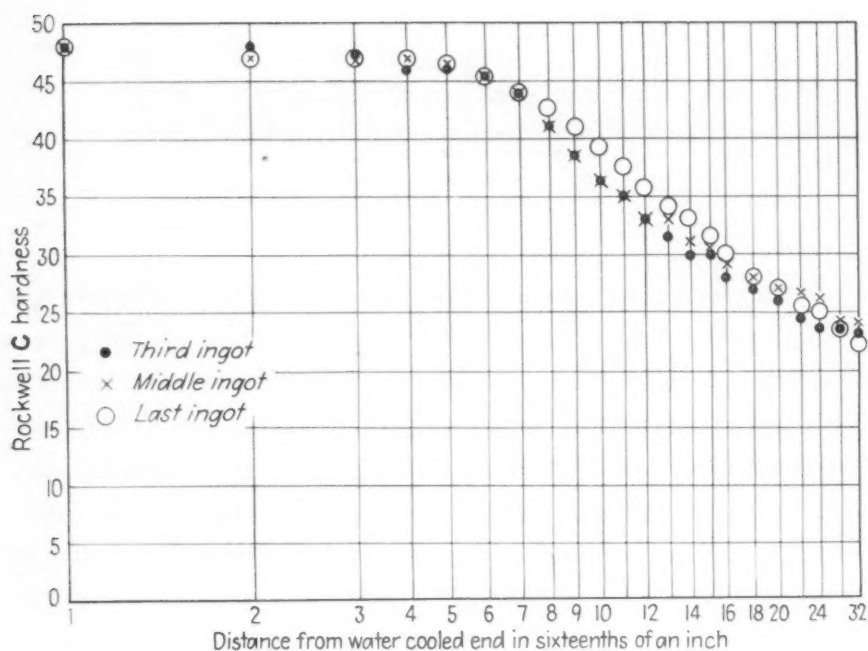


FIG. 1—End-quench hardenability tests for "boron fading." This is a low C-Mn-Cr-Mo steel, and 1/2 lb. of ferrobore was added per ton.

ium, zirconium or vanadium could quite easily compensate for this since the change in grain size was only of the order of one to two numbers to the coarse side. In other words, if the steel normally would have an 8 grain size, the same steel plus boron would likely give a steel of grain size 6. Using aluminum alone as a rectifier for this coarsening effect, it is recommended that 1/4 lb. of additional aluminum should be added to the boron treated steel.

Naturally one of the first physical properties to be investigated was impact values. The lower impact values obtained were not explained by the coarsening effect. This phenomenon, however, has been shown to be the result of mixed or duplex grain size. After producing a number of heats of steel, it was found that where the silicon content was held at a minimum of 18 points, and provided, of course, other conditions in the manufacture of the steel were normal, this duplex structure was not encountered. The present method includes in the specification 0.18 silicon minimum, plus an additional 1/4 lb. of aluminum to compensate for the coarsening effect of boron. A point has now been reached where a fine grain size steel free from duplex structure is being produced which gives comparable impact values with that of a steel to which boron has not been added and ductility

figures which are in every way equal to the non-boron steels.

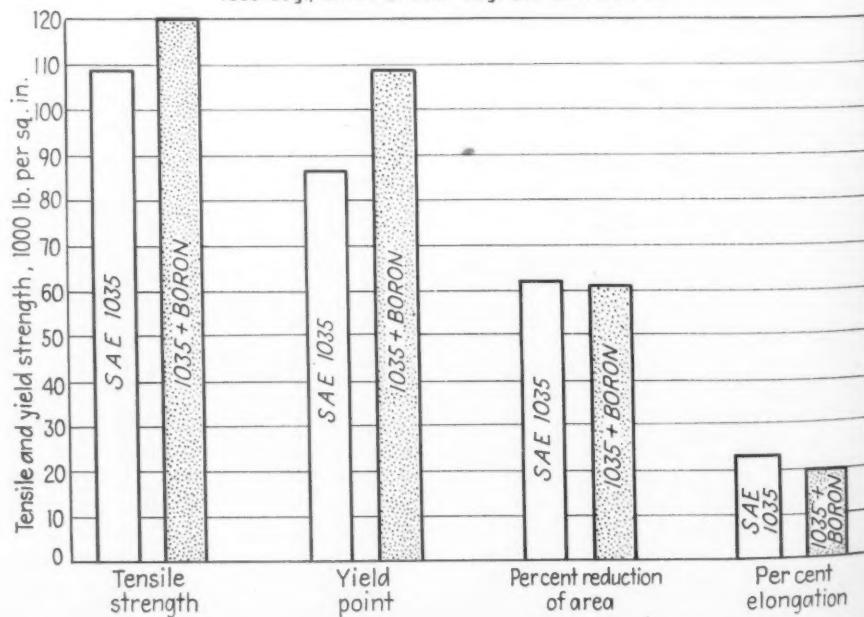
In order to obtain the highest recovery of boron, a practice has been developed whereby all deoxidizers and grain refiners are added to the molten steel in the ladle followed almost immediately by the ferrobore addition. The high solubility of the ferrobore allows the boron to become dissolved almost immediately, and the writer is now confident that between 85 and 90 per cent recovery of the boron as added to the ladle is being obtained.

It is recommended that the amount of ferrobore be divided into four or five portions, adding it as the ladle fills and getting the last portion into the ladle well before the appearance of the slag. The important thing is that the boron should be added to a well deoxidized steel and that it should dissolve rapidly in the liquid steel.

It may be stated here that in the original work, mold additions were used to determine the effect on various grades of steel, but it is obvious that this method is not nearly sufficiently uniform to give accurate control for regular commercial results. However, from the mass of information which is now available, most steel companies have familiarized themselves sufficiently with the addition of ferrobore to add it to the ladle and secure uniform results.

Some doubt has been expressed as to obtaining an even distribution of the boron throughout the heat of steel. Some have thought it necessary to produce a diluted boron alloy and to it add a number of the other known elements which would protect the boron from oxidation. In the steel made with Molybdenum Corp. ferrobore there have been no instances where there has been a concentration of boron or any localized effect. It is safe to say that were this difficulty encountered, some evidence would have been submitted by the steel companies using ferrobore. To date no such evidence has been brought to the company's attention. Evi-

FIG. 2—Physical properties of SAE 1035 and SAE 1035+boron steels. Oil quenched at 1500 deg., drawn at 1000 deg. Sections are 1 in.



dence has been collected from heats of steel varying from 1 ton to 250 tons. Samples have been taken throughout the heat and both chemical, spectrographic and hardenability tests have shown that very uniform results are being obtained and that no segregation of boron exists in any of these heats. A glance at Fig. 1 will show the Jominy hardenability test taken from the center of ingots from the first, middle and last of a 250-ton heat of steel, and these results were both satisfactory and uniform.

While most of the work was originally confined to a carbon steel, it was necessary to check into the various grades, and it is found that steels with a carbon content of from 0.20 to 0.60 per cent are more receptive and responsive to the boron addition. In the case of low carbon steels, 0.20 and under (especially those of the carburizing type), the extra penetration of hardness may produce too high a core strength and hence it might be necessary to reduce the manganese content. In some cases the manganese content can only be reduced to a certain amount, which will still be sufficient to make a satisfactory rollable steel, and in those cases, the boron addition is necessarily reduced. The additional physical properties obtained by boron are practically in direct proportion to the amount used up to 0.003 and, therefore, in the case of low-carbon steels which are used for carburizing purpose, most applications now call for the addition of 0.001 or 0.002 per cent.

In the case of carbon steels above 0.60 carbon, a condition is found where the hardenability has been increased by the extra amount of carbon so that the user or maker of steel is faced with using either a lower carbon plus boron or boron in a larger section of the higher carbon steel. As an example of this, a grade of 0.90 carbon steel in up to 1½-in. size was used without boron, but when the size increased to 2 and 3 in. a depth of hardness obtained was not satisfactory for the purposes when the steel was heat treated. Therefore, in this case an addition of 0.003 boron was recommended and found to give satisfactory results.

The addition of 0.003 boron to steel which is satisfactorily accomplished by adding ½ lb. of 10-12 per cent boron to the ton of steel in the ladle will add approximately 15 per cent increased yield and ultimate strength and this increase is

sufficiently high to put a number of ordinary carbon steels in a class almost equal to some of the low alloy steels. An example of this is in ordinary bolt steel. From a glance at Fig. 2, it may be seen that an ordinary SAE 1035 steel plus boron will give a steel with satisfactory physical properties. At the time of writing there are a great many other applications which are constantly being brought

sufficient hardenability. Therefore, the next thought was one of substitution.

As mentioned before, it was found that it is possible to take out of certain specifications 1 per cent nickel, 30 points of chromium, 10 points of molybdenum, 12 points of vanadium, or 20 points of manganese. While it is true that the Grossman factor would indicate that higher percentages of alloys

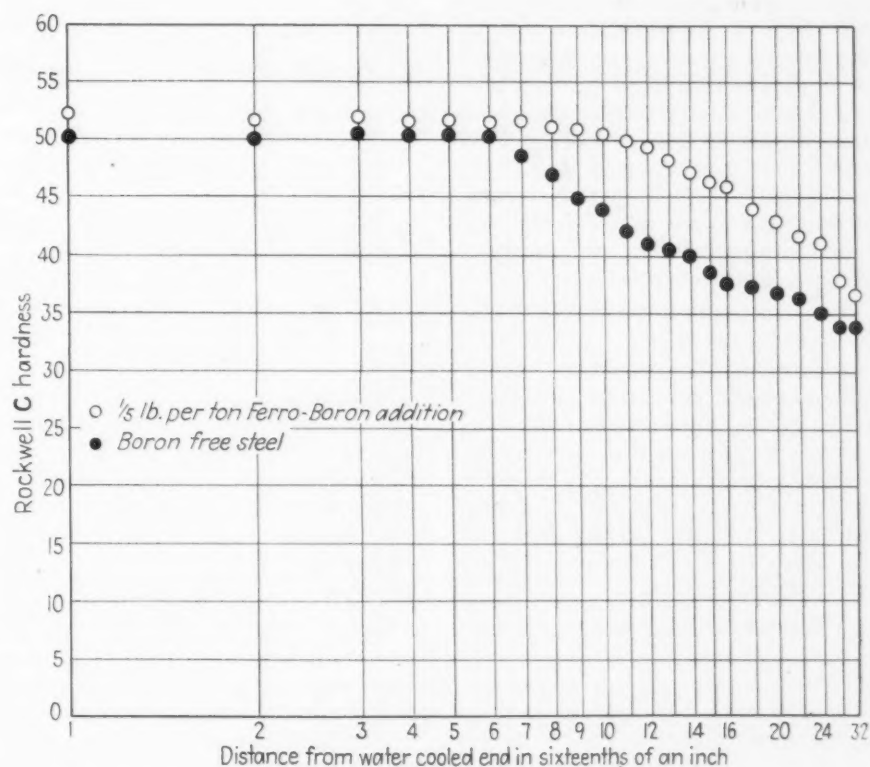


FIG. 3—End-quench hardenability tests showing the effect of ferroboron additions to specially deoxidized steel.

to the writer's attention, and there is sufficient evidence that carbon-boron steels are going to fill the gap for many uses in future steel requirements.

Naturally, there was some curiosity also as to the alloy steel field. From the results obtained it was evident that boron was of sufficient potency that it might interfere with some of the regular alloys. It was found, upon experiment, that the boron acted exactly as if it were added to carbon steel. In other words, increased penetration of hardness was obtained in steels whose analyses did not give sufficient hardenability to completely harden throughout the cross-section. It follows, therefore, that there is very little advantage to be gained in adding boron to a steel which, by its composition, has suf-

could be substituted, an exact substitution is not feasible, since steel making has not as yet developed into an exact science. Confronted with the fact that some variables in steel manufacture cannot as yet be evaluated, it was found in actual practice that boron additions can be substituted for an amount of alloys under the theoretically possible amount. A further variation enters the picture when two alloys are being used in a steel composition. Here again it is found that the rules do not follow theory. Hence, it is only by practice that boron can be satisfactorily substituted for some alloys, although Dr. Grossman's work is a valuable guide.

Since there has been an abnormal drain on the country's alloy resources, it is very evident that the use of boron, the raw material for

which is plentiful in this country, has come at a most propitious time. It is estimated that the steel industry is producing more than a million tons of alloy steel a month. For such a vast quantity of steel, a tremendous amount of alloy is required. Any portion of these that can be offset by the use of boron will afford that much more flexibility in the production of satisfactory alloy steels for all uses. An example of this is SAE 4130, where the chromium limits are 0.80 to 1.10 and molybdenum 0.15 to 0.25. It has been found to be possible to produce a steel whose chromium is approximately 0.80 to 0.85 and molybdenum approximately 0.15, thereby saving 2 lb. of molybdenum and 6 lb. of chromium per ton. Carrying this through to the many grades and types of steel and the quantities demanded, the savings possible are considerable.

Another angle in the use of boron is that since it is being substituted for hardenability properties rather than chemical properties, beneficial relief is not limited to any one element. As the supplies of various elements rise and fall, it is possible to utilize boron as a sort of pinch hitter in the substitution field for the alloys on which the inventories are temporarily low.

The industry is still without full

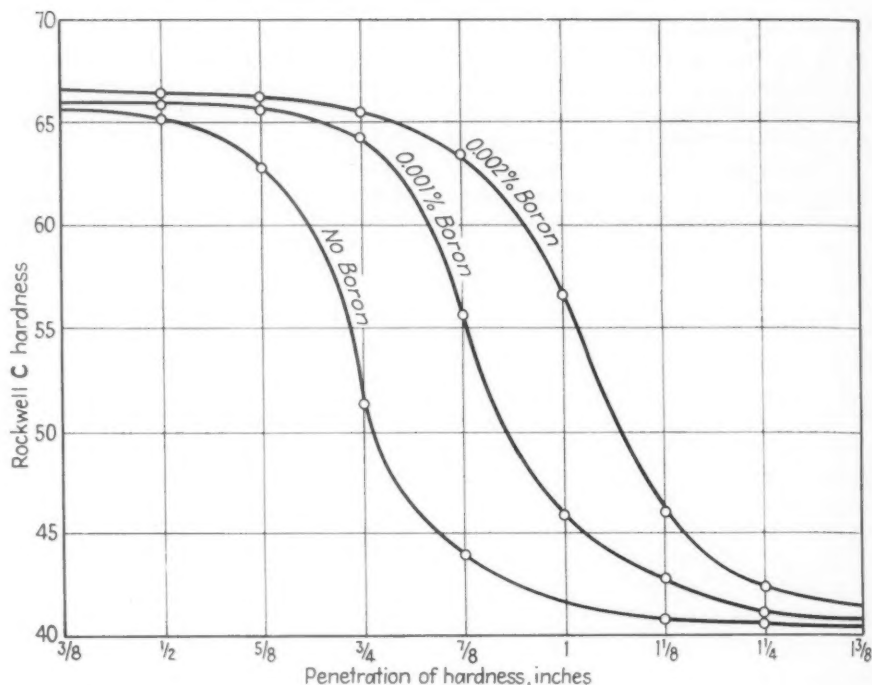


FIG. 4—Hardenability effect of boron on a 0.65 per cent carbon steel.

information on many points regarding the effect of boron. Machinability tests indicate increased cutting speeds at comparable hardness. Creep tests so far do not indicate any increase from boron. The use of boron in nitriding steels shows promise.

The use of ferroboration has grown

to such proportions that an appreciable percentage of alloy steel made today for many purposes contains boron. It has been employed in so many types of steels that it has carved a place for itself not only today in the ferrous industry, but certainly will have a great role in the post-war era.

Specifications for Zinc Alloys

THE accompanying table shows in convenient form the comparable ASTM, SAE, government and New Jersey Zinc Co. zinc alloy specifications. An emergency alternate Federal specification for builders' hardware, locks and lock trim is covered by Specification E-FF-H-106. There is another emergency alternate specification for plumbing fixtures covered by Specification E-WW-P-541A. These alternate specifications permit the use of zinc alloy die castings for certain stipulated applications having compositions conforming to Zamak-3, Zamak-5 and a special low aluminum zinc alloy whose composition is indicated as No. 5 MA. The data are from the New Jersey Zinc Co.

Comparable Government and Commercial Specifications for Zinc Alloys

A.S.T.M.	S.A.E.	Federal	Navy	Army	Air Corps	New Jersey Zinc Co.
B-86-41-T XXI	921	None	None 46-Z-2 & 46-Z-2 (Interim)	None	11328**	Zamak-2
B-86-41-T XXIII	903	None		57-93-2	None	†Zamak-3
B-86-41-T XXV	925	None	46-Z-2 (Interim) QQ-Z-351a & 46-Z-1a	None	None	Zamak-5
B-6-37 High Grade	None	QQ-Z-351a		QQ-Z-351a	None	Horse Head slab zinc
B-6-37 Special High Grade	None	QQ-Z-351a	QQ-Z-351a	QQ-Z-351a	None	Horse Head special slab zinc
B 69-39	None	QQ-Z-301a	47-Z-6b* & 47-Z-6* (Interim)	QQ-Z-301a	None	Rolled zinc and Zilloy

*Conforms to Federal Specification QQ-Z-301a.

**This Specification covers the use of zinc alloy for forming dies. There is also an Air Corps Specification 10302, covering zinc alloy welding rod for use in conjunction with Specification 11328.

†Doler-Zink, product of Doehler Die Casting Co., also corresponds to A.S.T.M. Specification B-86-41-T, XXIII—Ed.

MARTEMPERING

... This technique of quenching may have great promise for the future, and is applicable immediately to increase the usefulness of NE steels. In conclusion, herein, the author gives data on cooling rates, transverse hardness surveys for various NE steels, and a detailed description of the salt bath furnace used for quenching.

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THE heat stresses due to mass vary with the type of quench and are illustrated in Fig. 3. This graph shows the relative differences existing between the outside surface and center of similar rounds at 400 deg. F. where a small amount of martensite may be present or about to form.

It is readily seen that although the total time for outside and center to cool to bath temperature is approximately the same that a considerable difference of temperature exists during the intermediate ranges. For the sake of convenience, the temperature at which the initial martensite grain forms is called the Ms point. It is also readily seen that when the temperature of the center drops to the Ms point and martensite starts to form the temperature of the outside layers has dropped to a point where the transformation is practically complete. If the cooling rate of the center through the range 1300 to 1000 deg. F. has exceeded the critical cooling rate, martensite must form. This constituent has a lower specific gravity and the increase in volume causes such stresses that the piece often breaks.

Provided through hardening is desired, the quenching or cooling rate must be such that the critical cooling rate is exceeded in the center. A quenching medium should be selected to produce a minimum difference in temperature between the outside and center at the Ms point or cracking will occur.

It is also readily seen that if the piece could be quenched during the early stages of cooling in a fast medium so that the critical cooling

rate would be exceeded in all sections (making it compulsory for martensite to form) and then transferred to some bath at a temperature slightly above the Ms point, held in that bath long enough for the center to catch up to the outside and equalize in temperature, then further cooling could be permitted to occur in atmosphere so as to maintain the minimum temperature differential between the outside and center. Formation of martensite would then occur (as the tempera-

ture dropped) at a fairly uniform rate throughout the matrix of austenite. This soft constituent would cushion or adjust the stresses so that a minimum of residual strains would result.

If the cooling rate obtained in the liquid bath (held at temperature just above the Ms point) would be such as to exceed the critical cooling rate the piece could be quenched entirely in this bath, equalized in temperature, removed and allowed to cool in air. The Ms point varies

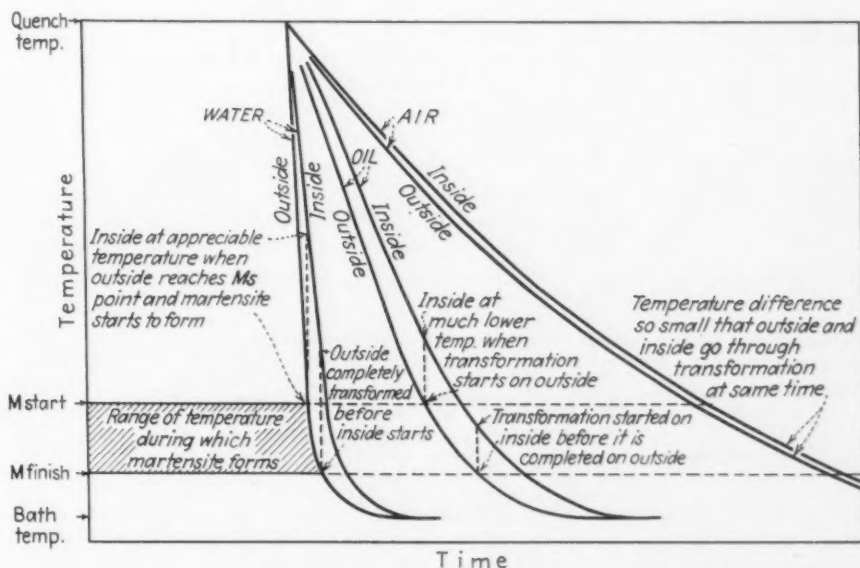


FIG. 3—Cooling rate of outside and center of similar rounds quenched in water, oil and air.

TABLE I

Steel	Deg. F.	C	Mn	Si	Ni	Cr	Mo	Cu	Ms Point deg. (approx.)
Carbon Tool Steel									380
SAE 4160	1575	0.61	0.59			0.94	0.33		500
E 4342	1500	0.42	0.68	0.18	1.74	0.81	0.29	0.10	530
A 4042	1500	0.43	0.90	0.23	0.23	0.27	0.26	0.07	610
A 4142	1500	0.41	0.86	0.30	0.11	1.06	0.23		590
NE 8749	1500	0.52	0.85	0.21	0.53	0.50	0.26		540
NE 8620*	1500	0.185	0.86	0.17	0.55	0.53	0.24	0.09	
A 4063	1500	0.64	0.85	0.29	0.19	0.24	0.27	0.09	445
NE 8442	1500	0.40	1.43	0.22	0.23	0.29	0.32		600
NE 8949	1500	0.49	1.01	0.20	0.54	0.56	0.38		535

*Beginning indefinite—100% martensitic (Mf point) at 600°F.

with different steels and the salt bath temperature must be altered accordingly. Table I shows Ms points for a number of steels. These data are furnished by the courtesy of P. Payson, Eastern Research Laboratory, Crucible Steel Co. of America.

This method of quenching requires the parts to be held in the salt long enough to equalize in temperature, followed by cooling in atmosphere. The operation is quite commercial as the pieces may be held in the salt for considerable periods after equalizing in temperature with no effect upon the results.

It may not always be desirable to allow the piece to cool in air to room temperature. If the temperature has dropped to 150 to 200 deg. F., a fair percentage of austenite

may still be present. Reheating the piece from this temperature range to the tempering temperature and holding at that temperature long enough to isothermally transform the austenite may result in the maximum freedom from residual

strains. This phase is being investigated. Considerable discussion has occurred among practical men for a long time over the value of exceedingly low holding times at the tempering temperature or tempering several times to provide maximum characteristics.

The data illustrated in Fig. 4 show the time required for 1 in., 2 in. and 3 in. rounds to equalize when quenched from 1550 deg. F. in salt at 400, 500, and 600 deg. (circulated with pump at 50 gal. per min.).

	Time in Minutes			
	Salt Temperature	400 deg.	500 deg.	600 deg.
Size	1 in. round	5	4	3½
Size	2 in. round	8	7	6
Size	3 in. round	13½	12½	11½

The cooling power of salt at elevated temperatures when used as a quenching medium is underesti-

TABLE II

	Yield Point, Lb. per Sq. In.	Tensile Strength, Lb. per Sq. In.	Elongation, Per Cent in 2 In.	Reduction, Per Cent	Brinell Hardness	Izod *
Quench No. 2 soluble oil at 80 deg. F.	146,000	156,650	19	57.3	321	48.5
Quench salt at 400 deg. F. Held 5 min. Cooled air	150,100	163,000	18	56.4	321	49.0

* 0.450 round bar; average of three tests.

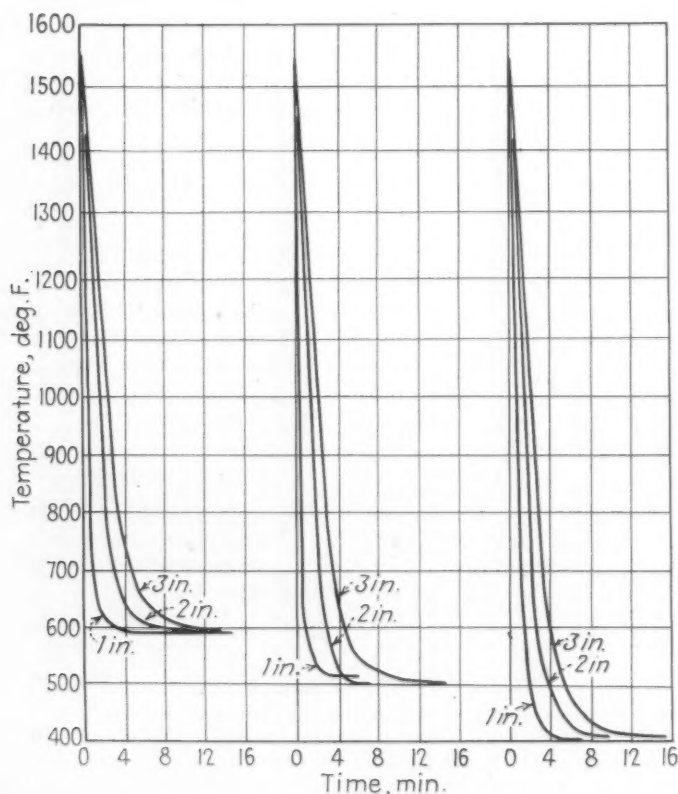


FIG. 4 — Time required for 1-in., 2-in. and 3-in. rounds to equalize when quenched from 1550 deg. in salt at 400 deg., 500 deg. and 600 deg.

mated. The curves in Fig. 5 show transverse hardness of various sized rounds of NE 8744 when quenched from 1500 deg. F. in 10 per cent brine, No. 2 soluble oil, salt at 400 deg. F., and oil at 400 deg. F. A slow figure-eight movement was used during quenching.

The salt at 400 deg. F. quenches decidedly faster than oil at 400 deg. F. The data indicate that it would be faster on rounds over 3 in. in diameter. Further work along these lines should be conducted on large sections. Ordinarily, quenching of heavy forgings over 10 in. is not recommended, and as a result full physical properties are not usually developed; considerable alloy is required to slow up hardenability to accommodate the particular quench used or attempts to use fast quenches introduce cracking hazards.

There are indications that the relief of stress may develop in increased physical properties. For example, considerable trouble was

FIG. 5—Transverse hardness of various sized rounds of NE 8744 steel when quenched from 1500 deg. in brine, soluble oil, salt and oil at 400 deg. The NE 8744 analysis is 0.43 C, 0.87 Mn, 0.03 P, 0.008 S, 0.50 Cr, 0.46 Ni, and 0.27 Mo.

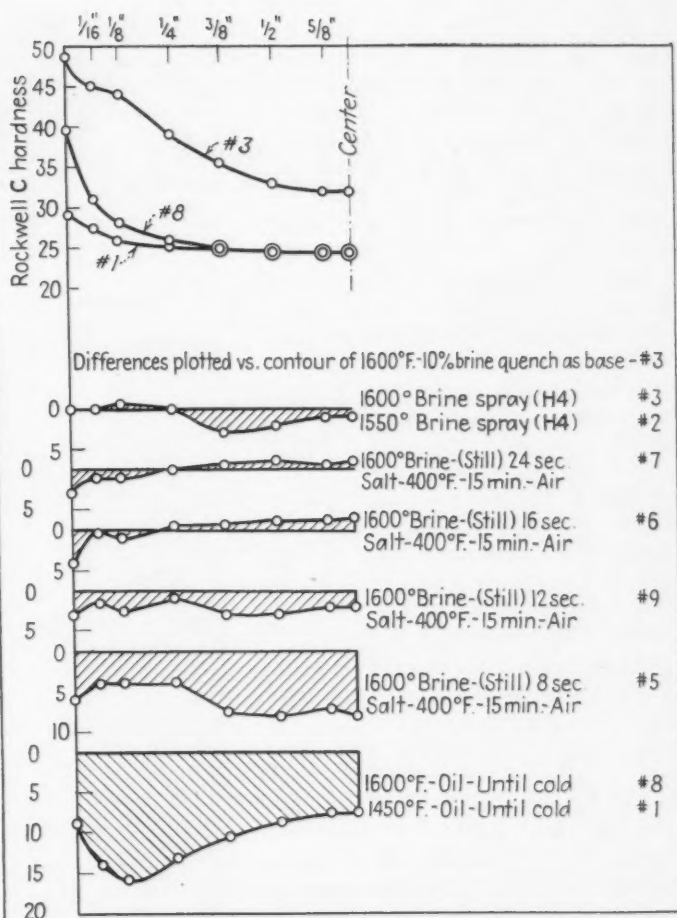
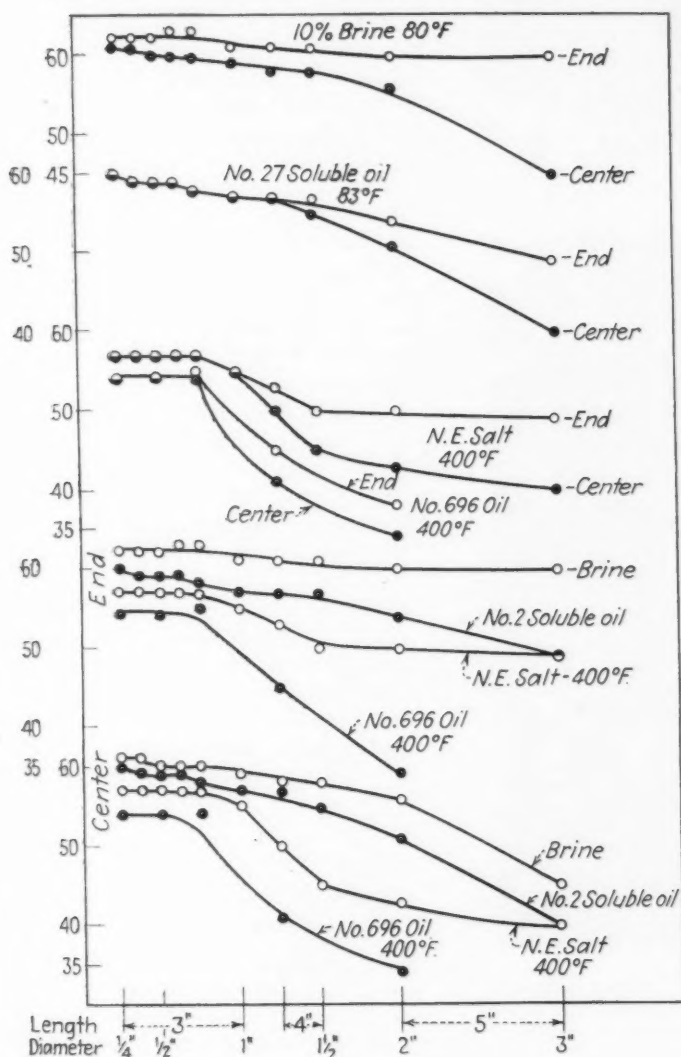


FIG. 6—Hardness surveys of 1/2-in. thick slabs taken midway between ends of 1 3/8 x 4-in. rounds of NE 8724 steel, quenched completely in brine and oil and with timed quenches in brine, equalized in salt at 400 deg. F and finish cooled in atmosphere. The NE 8724 analysis is 0.23 C, 0.83 Mn, 0.19 Si, 0.39 Ni, 0.54 Cr and 0.24 Mo.

encountered in quenching 3/4 in. rounds of NE 8442, which has high hardenability. About 50 per cent of the pieces quenched in oil cracked longitudinally. The same hardness with no tendency toward cracks was developed from the same quenching temperature (1500 deg. F) by quenching in salt at 400 deg. F, removing after 5 min. and allowing to cool in atmosphere. Tensile properties on adjacent pieces from the same bar quenched in oil and salt, tempered to 1100 deg. F. (no cracks) are shown in Table II:

NE 8724 is ordinarily hardened by an oil quench. Considerable increase in core hardness can be obtained by a timed water quench, transfer to salt at 400 deg. F, holding until equalized in temperature and then allowing to cool in air.

Hardness surveys were made of the cross-section of 1 3/8 in. rounds quenched completely in brine and oil

and with timed quenches in brine, equalized in salt at 400 deg. F and finish cooled in atmosphere. (See Fig. 6.)

The 8-sec. quench is obviously too short a time to obtain a rate of cooling fast enough to exceed the critical cooling rate on either outside or center of a 1 3/8 in. round (not carburized) but a slightly longer time is sufficient. It is interesting to note that increasing the temperature of the straight oil quench merely increases the hardness in the surface layers. No. 8 (1600 deg. F) vs. No. 1 (1450 deg. F).

The increase in hardness in the center obtained with a timed brine-salt quench over the straight oil quench in this 1 3/8 in. round section corresponds to an increase in tensile from 122,000 T.S. (25 Re) to 165,000 T.S. (35 Re), with decrease in ductility from 23 per cent

to 18 per cent. No change in distortion was produced by this timed water-salt quench.

Care must be exercised so that parts are not cooled too long in the brine or water. If outside layers actually form martensite the purpose of the timed quench is neutralized and actual danger exists due to immersing wet pieces in salt at 400 deg. F., or higher temperatures.

Note: The temperature of the surface may be determined after any timed quench by use of Tempelstiks (THE IRON AGE, July 24, 1941). These are crayons made of mixtures of salt melting at stated temperatures. These are applied quickly to the piece before it is placed in the salt, then behavior noted and temperature estimated accordingly.

NE 8949 is an intensive hardening material and trouble with quench cracking is likely in large sections. This danger can be eliminated by a quench in salt at 400 deg. F., holding long enough for temperature equalization and allow-

ing to cool in air. The air cooling is vital as any increase in cooling rate from 400 deg. F. will reestablish a temperature differential with corresponding difference in time at which the martensite will form and increase in residual stresses. The same hardness values will be obtained by the salt quench as with an oil quench.

Salt bath furnaces for quenching purposes are simply constructed at low cost. (See Fig. 7.) A pressed steel pot of sufficient capacity of the type ordinarily used for higher temperatures can be purchased or rolled to a cylindrical shape from thin boiler plate and welded. This pot used to contain the salt is placed inside another similarly shaped steel shell approximately 8 in. larger in diameter and 4 in. deeper. This outside pot is finished with an outlet to the sewer.

The inner pot rests on a number of blocks or bricks spaced according to the weight of salt to be supported. At the top of the inner pot, close to the outside, a conforming piece of pipe, $\frac{1}{2}$ in. to 1 in., is attached by "tack on" electric welds. This pipe has been line drilled with a row of small ($\frac{1}{16}$ in.) holes, spaced about 1 in. apart. When placed in position on the inner pot these holes are directed against the sides of the pot.

Several braces are arranged so as to hold the inner pot in place.

The salt is heated by GE Calrod heating units. These units quoting the GE catalog, "are constructed by taking a helical coil of highest quality resistance wire and stretching and centering it in a seamless metal tube. Magnesium oxide powder is then shaken and packed down into the tube around the helical resistance coil. The entire tube is then compressed so that its diameter is reduced and the magnesium oxide powder is packed to the solidity of rock.

"Magnesium oxide is a non-conductor of electricity but has the property of transferring heat from the coil to the metal sheath very quickly. It entirely fills the interior of the metal tubing so that air cannot reach the resistance wire and oxidation is consequently prevented.

"Sealed away from air, and thoroughly guarded against physical damage, the Calrod unit is practically indestructible."

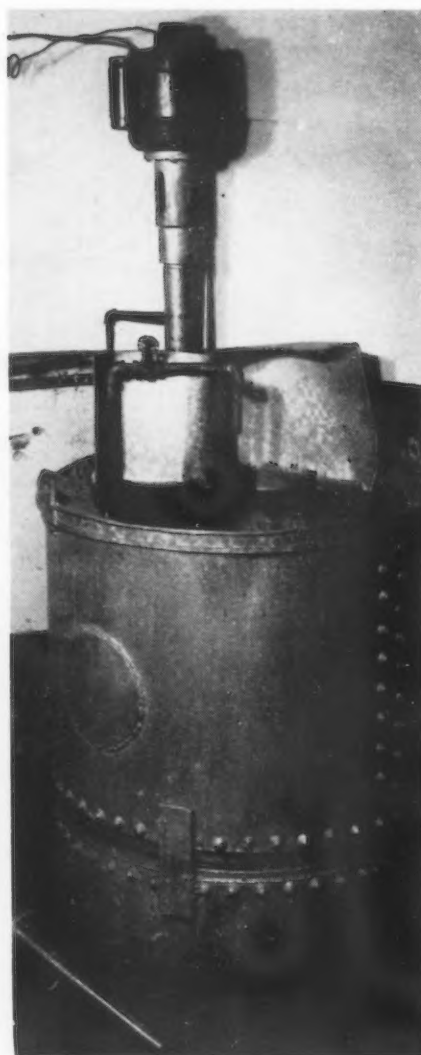


FIG. 7—This type of salt bath furnace for quenching purposes may be constructed at low cost. Controls may be manual or automatic.

These units are sold in a variety of lengths and sizes and are usually bent to shape at the user's plant.

Two of the 5000 watt, 230 volt, either ac or dc catalog No. 4A282 units have been used successfully in at pot 24 in. in diameter and 20 in. deep (18 in. depth) containing about 400 lb. of salt. These units are 157 $\frac{1}{4}$ in. long, $\frac{1}{2}$ in. in diameter and have an effective heating length of 114 in. with maximum allowable sheath temperature of 750 deg. F and list for \$29.40.

When cold, these units bring the pot mentioned above to 400 deg. F in about 4 hr., and in about 2 $\frac{1}{2}$ hr. after operation the preceding day. They are bent in a hair pin shape so that the major portion rests on the bottom of the pot.

These heating units are controlled mainly by an on-and-off switch or automatically if desired. After the salt is heated, the major portion or all of the heat required to maintain temperature is obtained from the work: If the salt temperature starts to rise objectionally, water is turned on the pipe surrounding the inner pot. Adjustment can readily be made so as to strike a balance between heat in and heat lost.

Automatic arrangements can be made so that the heat is turned on if the temperature drops below the minimum desired and water if above the maximum.

Due to the low temperatures involved, thermometers may be used at one-third the cost of conventional pyrometers. The following equipment, obtained from Brown Instrument Co., may be used as an illustration.

(1) Model 6481—820, No. 2 Recording Control Thermometer. 24 hr., 8 in. chart graduated 0 to 800 deg. F, 220 volt, 60 cycle AC plain S.S. bulb; 3 $\frac{1}{2}$ x $\frac{1}{2}$ in.; 5-ft. capillary tubing; price \$139.

(2) ASCO solenoid valve, model No. PFX 82102, $\frac{1}{2}$ in. size, for use on water up to 150 lb.; price \$16 less 15 per cent.

(3) Contractor panel for use on 220 volt, 60 cycle, AC load=10,000 watts, capacity=50 amp.; price \$40.

Circulation of the hot salt is desirable to obtain temperature uniformity and maximum cooling effect upon the work. A propeller stirrer may be mounted on top or circulation maintained by a hot salt pump (5 hp.) as manufactured by Ingersoll-Rand Co.

When the operation is discontinued, a plug, tapered to permit easy extraction, is hung in the pot with the tip just above the elements. This is removed before remelting the salt. Inasmuch as the heating elements are on the bottom of the pot this portion would become liquid first and expansion troubles occur if the plug was not used.

Cost of construction depends upon size of pot desired. Under any conditions, it is low. This is primarily because the operating characteristics are unorthodox. There is no necessity for the conventional insulation, etc., as the heat is principally or totally supplied by the work when furnace is in operation.

Steel Carburization and Decarburization —A Theoretical Analysis

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CARBURIZATION had its beginning in antiquity and up to about 1740 carburization was the only method used for making steel. Today carburization is still a very important commercial process for the production of hard cases for wear resistant surfaces. Old as the carburization phenomenon is, little progress has been made until recently in the understanding of the kinetics involved. As a matter of fact a great deal of case-hardening is still done empirically. Few attempts have been made to rationalize the behavior of carbon in steel^{53,54} and while partly successful they have failed to simplify the problem completely.

Decarburization, the nemesis of the heat-treater, is discussed here for the sake of completeness. In itself the decarburization process is unimportant when compared to carburization, although it is sometimes used as a purification method for special alloys.

In carburization, the rate of diffusion of the carbon into the steel is the controlling factor in establishing a "case." The type of case, its thickness and the carbon gradient will then be dependent only on the factors influencing the rate of diffusion in a given system, namely, time and temperature.

The depth of case is very important, but if the carbon gradient is too steep or too flat, the correct type of case may not result and consequently will not respond correctly to heat treatment or will lack proper service properties.

Since both carburization and decarburization are dependent upon the diffusion of carbon, the quanti-

... In concluding this three-part article, the kinetics of carburization and decarburization are set forth. This discussion deals with the formation of case (diffusion of C into the metal) on one hand, and the formation of decarburized layers (migration of C from the metal) on the other. The effects of time, temperature and grain size on these phenomena are considered, and calculations of the penetration curve have been made for carburized and decarburized steel.

tative treatment of each can be made by application of the differential equation first derived by Fick⁵⁵.

His first law states that the amount of substance penetrating is proportional to the product of the concentration gradient and the area through which this metal diffuses.

$$S_{ix} = -qD_i \frac{dc_i}{dx} \quad (26)$$

where x = distance; S_i = rate of penetration in x direction; c_i = concentration of substance i ; D = proportionality factor, and q = area through which diffusion occurs.

Several analyses of the differential equation have been made^{56,57} but only the van Orstrand-Dewey method⁵⁸ need be considered in our discussion. It should be pointed out that in these solutions the diffusion coefficient has been assumed to be constant, i.e., independent of the concentration. The variation of the co-efficient has been considered by Matano⁵⁹.

Equation 26 is usually written as follows:

$$\frac{dc}{dt} = -qD \frac{dc}{dx} \quad (27)$$

If the expression is used in cgs

units, then D represents the amount of substance in grams diffusing in 1 sec. across an area of 1 sq. cm. with a unit concentration gradient. This coefficient then has the dimensions of centimeters square per second ($\text{cm}^2/\text{sec.}$). The equation is negative as the concentration gradient is negative.

Numerous investigations have been made to determine the diffusion coefficients in gamma iron^{48, 60, 61}, but the work of Paschke and Huattman,⁶² and of Wells and Mehl⁶³ is the most outstanding.

The diffusion coefficients of carbon in gamma iron were calculated from the equation given by Wells and Mehl:

$$D = 0.12 e^{-\frac{32,000}{RT}} \quad (28)$$

and the values at 0.7 per cent C are plotted in Fig. 8.

Effect of Grain Size on Diffusion of Carbon: Any discontinuity in the metal structure might be expected to interfere with the diffusion of carbon, and it is logical to suppose that grain boundaries might affect the diffusion.

The effect of grain size,^{64, 65} though suspected, has not been

critically studied until recently. The diffusion literature is full of data with D plotted against $\frac{1}{T}$, and the data show no pertinent effects that might be ascribed to grain size, although most investigators have neglected this point altogether.

Arguing in such broad terms is not as effective as a conclusive experiment. A critical experiment performed by Wells and Mehl⁶³ shows that the rates of diffusion of carbon in a steel containing 2500 to 3000 grains per sq. mm. and one containing 35 grains per sq. mm. were identical.

Effect of Impurities on the Diffusion of Carbon: Impurities might be thought of as affecting the diffusion of carbon. Data on this are scarce. Bramley and co-workers¹⁷ have reported that oxygen influences the diffusion coefficient of carbon, but this has not been confirmed by the work of Wells and Mehl,⁶³ who find no effect of oxygen on the coefficient. In a comparison between the commercial steel and high purity steel, and commercial ingot iron (Armco) and high purity iron, Wells and Mehl showed that ordi-

TABLE VI
Variation of the Diffusion Coefficient With Temperature

Temperature		D (cm ² /sec.)
C. deg.	F. deg.	
800	1470	4.1×10^{-8}
850	1560	8.4×10^{-8}
900	1650	1.4×10^{-7}
950	1740	2.4×10^{-7}
1000	1830	4.1×10^{-7}
1050	1920	6.2×10^{-7}
1100	2012	1.0×10^{-6}

nary impurities such as sulphur, phosphorus, silicon and manganese do not affect the diffusion coefficient of carbon. From this evidence it seems permissible to say that impurities commonly present in steel do not affect the diffusion of carbon to any significant extent.

Influence of Alloying Elements on the Diffusion of Carbon: Knowledge of the effect of alloying elements on the diffusion of carbon is limited mostly to the work of Mehl and his associates^{66, 67}. Wells and Mehl¹³ found no apparent effect of nickel (1.9 per cent) and manganese (2.5 per cent) on the diffusion coefficient of

carbon in austenite as compared to carbon steel.

While this may be true of nickel and manganese additions to iron, the situation for carbide-formers such as vanadium, tungsten and titanium is complicated for they restrict the migration of carbon into the metal by forming stable carbides.

Kinetics of Decarburization

From the preceding discussion, it has been shown that reliable data exist for the diffusion coefficient of carbon. It has also been pointed out that grain size, normal impurities and small alloying additions of nickel and manganese have no complicating effect which would invalidate the mathematical treatment of diffusion as applied to plain carbon steels used in commercial carburization.

With a knowledge of the diffusion coefficient, it is possible to calculate the concentrational gradient under given conditions of time and temperature. From the solution of van Orstrand and Dewey,⁵⁸ the carbon penetration curves can be calculated. The solution of the differential equation assumes that the diffusion occurs from a continuously saturated phase into the

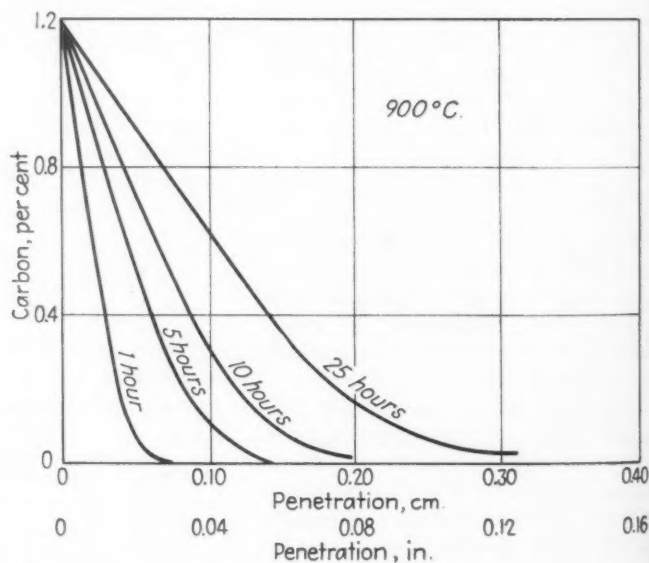
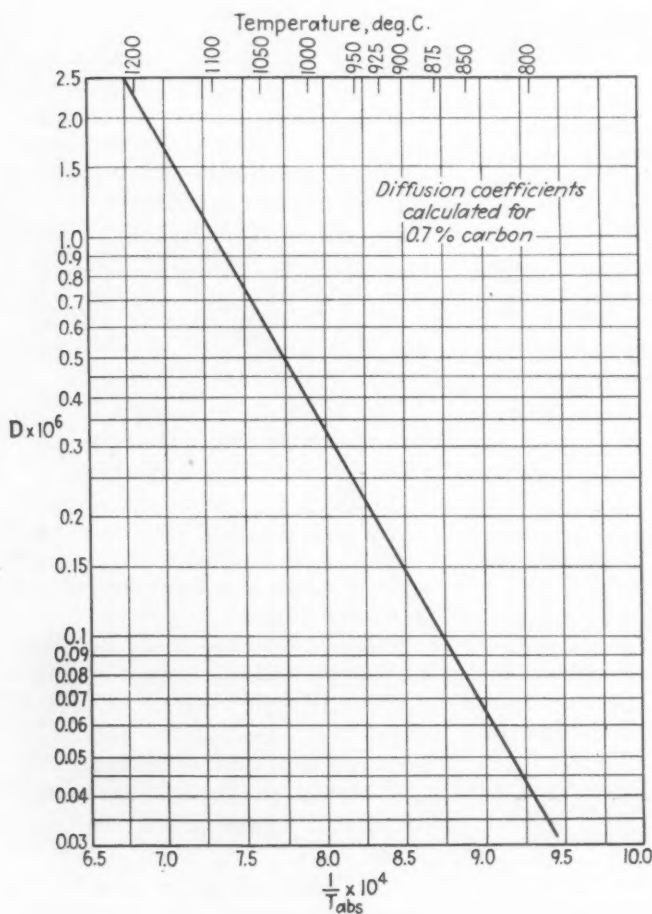


FIG. 9—Effect of time on carburization at 1650 deg. F.

FIG. 8—Variation of diffusion coefficients of carbon in gamma iron with temperature changes.

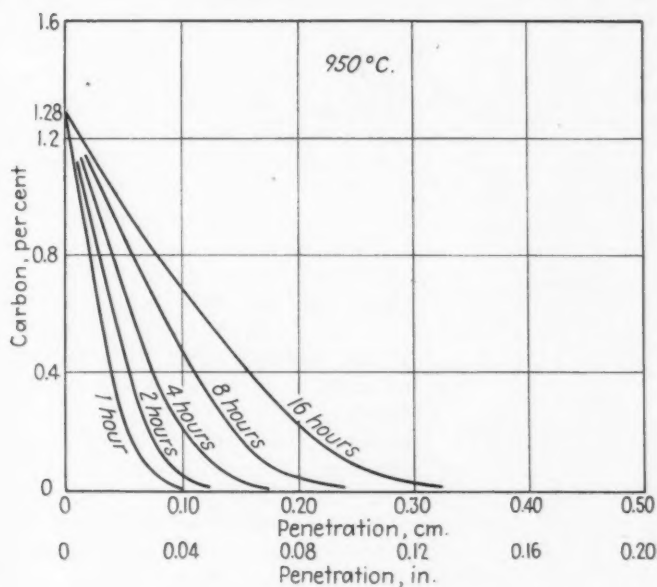


FIG. 10—Effect of time on carburization at 1740 deg. F.

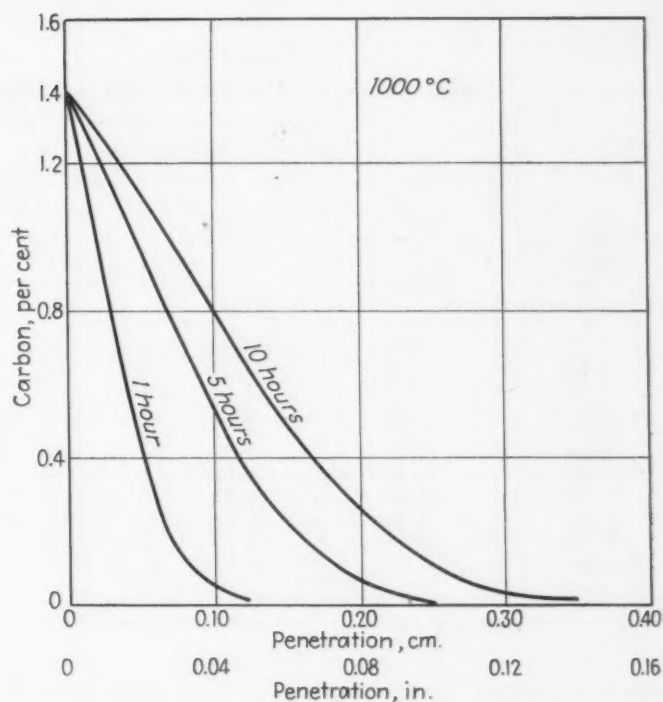


FIG. 11—Effect of time on carburization at 1830 deg. F.

pure solvents. In the carburization of iron, an infinitely thin layer of iron (the immediate surface) is carburized to saturation and then the carbon migrates into the iron.

The van Orstrand and Dewey solution of Equation 27 is

$$C = C_0 \left[1 - \phi \left(\frac{x}{2\sqrt{Dt}} \right) \right] \quad (29)$$

where C = Carbon at point x in per cent.

C_0 = Carbon on the immediate surface; the limit of solid solubility of carbon in iron at the carburizing temperature.

D = The diffusion coefficient in sq. cm. per sec.

t = Time in seconds

ϕ = Gauss error function

x = Penetration in centimeters

From Equation 29, it is possible to calculate the case formed on carburization of a steel. The use of the formula with a constant coefficient of diffusion leads only to an approximation of the actual case. This is due to the fact that the coefficient of diffusion of carbon varies with concentration. In order to obtain the actual case which results during the carburization process, the following procedure is followed. The coefficient of diffusion for the carbon concentration is found from the following relation⁶³

$$D = (0.07 + 0.06 \times \text{per cent } C) e^{-\frac{32,000}{RT}} \quad (30)$$

where T is in degrees Kelvin

R is the gas constant

The approximate penetration curve is then calculated for a given time at various distances in from the surface. A comparison of this curve to the actual case shows good agreement near the surface but departs with appreciable error near the end of the gradient. If the calculation is carried out for the D coefficient for the various carbon contents found at the distances in the approximate calculation above and substituted in Equation 29, the calculated and actual carbon contents of the various layers can be found to within 10 per cent. This is illustrated in the following calculation.

This example is drawn from the work of Bramley and Lord⁶⁸ who

carburized four Armco iron rods for 10 hr. at 1830 deg. F. in an atmosphere of CO saturated with toluene ($C_6H_5CH_3$) at 64.4 deg. F. The results of the experiments were plotted and the carbon at various depths was averaged for the four bars. These data are tabulated in Table VII and give some idea of the variation to be expected in bars carburized under as identical conditions as possible.

A calculation of the penetration curve from Equation 29 leads to the results given in Table VIII, column 3, disregarding the effect of concentration. In column 4 and 5, the variation of the diffusion coefficient was considered, indicating the accuracy with which the

TABLE VII
Actual Data Obtained From Carburized Bars, Per Cent Carbon

Depth From Surface, cm	Exp. 1	Exp. 2	Exp. 3	Exp. 4	Av.
0.000	1.40	1.40	1.40	1.40	1.40*
0.025	1.24	1.28	1.27	1.26	1.26
0.050	1.10	1.13	1.08	1.09	1.10
0.075	0.98	0.97	0.92	0.94	0.95
0.100	0.84	0.82	0.79	0.79	0.81
0.125	0.68	0.64	0.62	0.66	0.65
0.150	0.50	0.48	0.46	0.50	0.48
0.175	0.33	0.36	0.32	0.35	0.34
0.200	0.24	0.22	0.20	0.23	0.22
0.225	0.14	0.14	0.12	0.16	0.14
0.250	0.09	0.08	0.06	0.08	0.08

*Assuming that the outer layer is saturated at 1830 deg. at 1.4 per cent C.; this checks with an extrapolation of the points determined above.

TABLE VIII
Calculation of an Actual Carburized Case

Column 1 Depth From Surface, cm	CARBON CONTENT			Column 5
	Column 2 Average Found by Expt. (Table VII)	Column 3 Per Cent Found from Eq. 29	Column 4 Per Cent Found by Correcting D	
0.000	1.40	1.40	1.40
0.025	1.26	1.23	1.26
0.050	1.10	1.08	1.09
0.075	0.95	0.91	0.92
0.100	0.81	0.77	0.77
0.125	0.65	0.63	0.63
0.150	0.48	0.52	0.48
0.175	0.34	0.42	0.35	0.35
0.200	0.22	0.34	0.25	0.24
0.225	0.14	0.25	0.17	0.15
0.250	0.08	0.18	0.11	0.08

penetration curve can be calculated.

In the above table the agreement with constant D is good to a depth of 0.150 cm. but beyond 0.150 cm. the difference between values in column 4 and the actual values in column 2 becomes larger. The data beyond 0.150 cm. can be improved by finding the diffusion coefficients for carbon values in column 4 and recalculating the carbon in the layers.

Time Effect on Carbon Gradient

The element time is of the greatest importance in commercial carburization, and an understanding and appreciation of its effect can lead to improved commercial carburization practice. The effect of time is plotted in Figs. 9, 10 and 11, for 1650, 1740 and 1830 deg. F., respectively.

From Equation 29, it is obvious that the penetration of carbon is proportional to the square root of

the time. This means that if the depth of case were to be doubled, the carburizing time would be quadrupled or if the case were to be tripled, the carburizing time would have to be increased nine times.

This follows because

$$p \sim \sqrt{t}$$

$$2p \sim 2\sqrt{t}$$

$$\sim \sqrt{4t}$$

or

$$p \sim \sqrt{t}$$

$$3p \sim 3\sqrt{t}$$

$$\sim \sqrt{9t}$$

Fig. 10 shows how the depth can be doubled by quadrupling the time. If some arbitrary carbon content is assumed, say 0.2 per cent C as the limit of the case, the following can be shown to be true

$$2 \text{ hr.} \sim 0.07 \text{ cm. (0.028 in.)}$$

$$8 \text{ hr.} \sim 0.14 \text{ cm. (0.056 in.)}$$

Effect of Temperature on Carbon Gradient: Since the penetration of carbon is also a function of the square root of the diffusion co-

efficient, it would be expected that to double the penetration the diffusion coefficient would have to be quadrupled. This is readily feasible because the diffusion coefficient is an exponential function.

$$D = Ae - \frac{Q}{RT} \quad (31)$$

and a very small change in T can change the diffusion coefficient by a factor of 4 so that the case depth can be doubled. For example, if one were to carburize for 5 hr. at 1650 deg. F., the depth of case could be doubled by carburizing at 1900 deg. C. in the same length of time. This, however, is true only as far as the diffusion coefficient is concerned, because as the temperature is increased the solid solubility of carbon in iron is increased; in this case the solubility of 1.18 per cent C at 1650 deg. is increased to 1.45 per cent C at 1900. This change in solubility causes a change in concentration gradient; therefore a case formed at 1900 deg. is different from one at 1650 deg., and no strict comparisons can be made.

The influence of temperature on the carbon gradient is shown in Fig. 12 for a constant time of 5 hr.

In most carburization practice the highest practicable temperatures are used. The introduction of fine-grained steels has made the use of high temperature carburization comparatively easy. Temperatures of 1750 deg. are common practice. Temperatures of 1550 deg. F. to 1650 deg. F. are used for very thin cases; temperatures of 1650 to 1750 deg. F. are used for general carburization, but temperatures above 1750 deg. F. offer mechanical and metallurgical difficulties.

In case-hardening, it is sometimes desirable to control penetration of carbon by other means than the time and temperature. This can be done in two other ways, namely, by the deposition of a certain amount of carbon on the steel as determined by equilibrium between gases and metal and by diffusion of the carburized material by annealing in a neutral atmosphere.

By selecting the proper carburizing mixtures, as well as time and temperature, any carbon concentration within the solid solubility limits can be obtained. This, however, is extremely difficult to do. Usually high surface carbon is diffused into the metal in a neutral atmosphere to obtain the desired gradient. Bramley and Lord⁶⁸ have

TABLE IX
Calculation of the Decarburization Curve

Penetration, cm.	Per Cent C Found by Experiment	Per Cent C Calculated From Eq. 32	Per Cent C Corrected For D
0.025	0.22	0.130	0.15
0.050	0.31	0.255	0.29
0.075	0.46	0.365	0.40
0.120	0.57	0.540	0.56
0.170	0.68	0.680	0.68
0.210	0.74	0.740	0.75
0.230	0.77	0.780	0.78
0.250	0.80	0.800	0.80
0.290	0.84	0.820	0.82
0.340	0.85	0.840	0.84

carried out work to show how carbon is redistributed in the work by reannealing. The type of gradient obtained with carbon monoxide saturated with toluene for 10 hr. at 1830 deg. F. is shown in Fig. 13. The slopes for the bars receiving a 10 hr. anneal at various temperatures in an atmosphere of stagnant CO (an approximation to a neutral atmosphere) have been decreased appreciably and the depth of the

be found in the work of Bramley and Allen⁴⁸ and Johansson and von Seth²⁶. Such curves are of no commercial importance but are included in the discussion to demonstrate that the phenomenon can be rationalized in terms of rate of diffusion of carbon.

Referring to Fig. 14, it is noticed that some curves do have zero carbon at the surface. While such curves complicate the mathe-

time t ; also when t is large so that

$\phi\left(\frac{x}{2\sqrt{Dt}}\right)$ is equal to unity when

$$C = C_0.$$

These conditions are fulfilled in the following expression:

$$C = C_0 - C_0 \left[1 - \phi\left(\frac{x}{2\sqrt{Dt}}\right) \right] \quad (32)$$

where the symbols have the same meaning as in Equation 29.

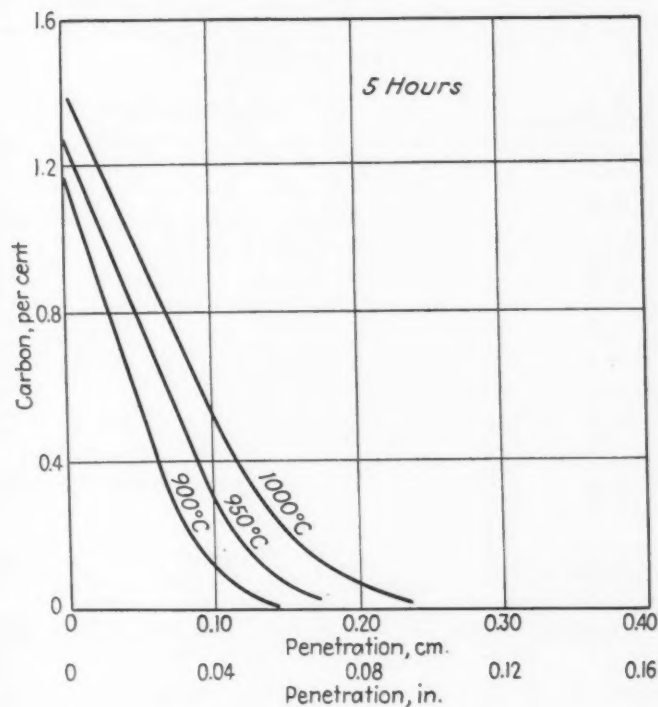


FIG. 12—Effect of temperature on carburization with time a constant at 5 hr.

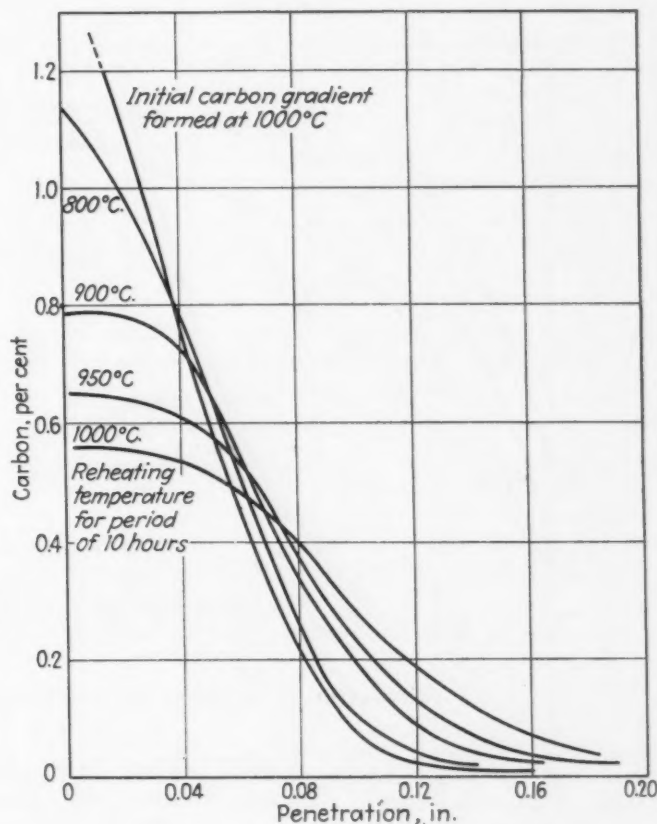


FIG. 13—Carbon gradient obtained with CO saturated with toluene for 10 hr. at 1830 deg. F.

cases has been somewhat extended. Control of carbon by this method is often carried out commercially in neutral atmospheres or by copper plating the specimens and reintroducing into the carburizing medium.

Kinetics of Decarburization

The phenomenon of decarburization, in which instance the carbon is removed from a high carbon steel, can be treated analytically in much the same way as the carburization.

When carbon is abstracted from the steel, curves such as in Fig. 14 are obtained. These have been called decarburization curves. Such curves and corresponding data can

mathematical analysis, curves starting at zero carbon can readily be treated.

Calculation of Decarburization Curve

In the calculation of the decarburization curve, such as shown in Fig. 14, it is necessary to make several assumptions. First, the rate of surface reaction is high, so that the carbon content of the outer surface is zero; and second, the rate of decarburization is dependent entirely on the diffusion of carbon to the impoverished surface.

The solution of Fick's law by van Orstrand and Dewey will suffice, but the solution must be modified so that a new set of limiting conditions will govern the solution of this differential equation. They are that when $x = 0$, $C = 0$ for any

The decarburization curves can be analyzed with Equation 32 but there is one stumbling block, and that is the time. The time t is not the total time at the decarburizing temperature; it is less than that, for some time must elapse for the carbon in the surface to reach zero in the outermost layers, so that the conditions under which the equation is operative are reached. One solution is to take one experimental point on an actual decarburization curve and solve Equation 32 for t' . This new t' is then substituted in the equation and the penetration at any point can then be determined.

The penetration and carbon for the curve for 1750 deg. F. of Fig. 14 has been thus calculated, and

has been compared to the observed values of Bramley and Allen in Table IX.

The calculation is carried out in this manner:

First, the corrected time must be found, i.e., the time for the surface carbon to reach zero. This can be found by analyzing the surface for carbon or taking a point on the decarburization curve which is known to pass through zero car-

burization are also valid. Therefore, the rate of decarburization at a certain temperature is proportional both to the square root of D and t . Since the diffusion coefficient varies exponentially with temperature, the rate of decarburization increases much more rapidly than it would by increasing the time.

Since the decarburization curves are of little value, other than aca-

to show that the presence of Al_2O_3 (0.15 per cent) did not affect the width of the ferrite bands. This experiment would disprove Berglund's⁶⁹ contention that decarburization might be increased by the catalytic action of Al_2O_3 .

Since the diffusion of carbon appears to be independent of the grain size in carburization experiments, it is quite likely that it plays no significant part in decarburization. If it did play a part, the likelihood of accurately calculating decarburization curves would have been greatly diminished.

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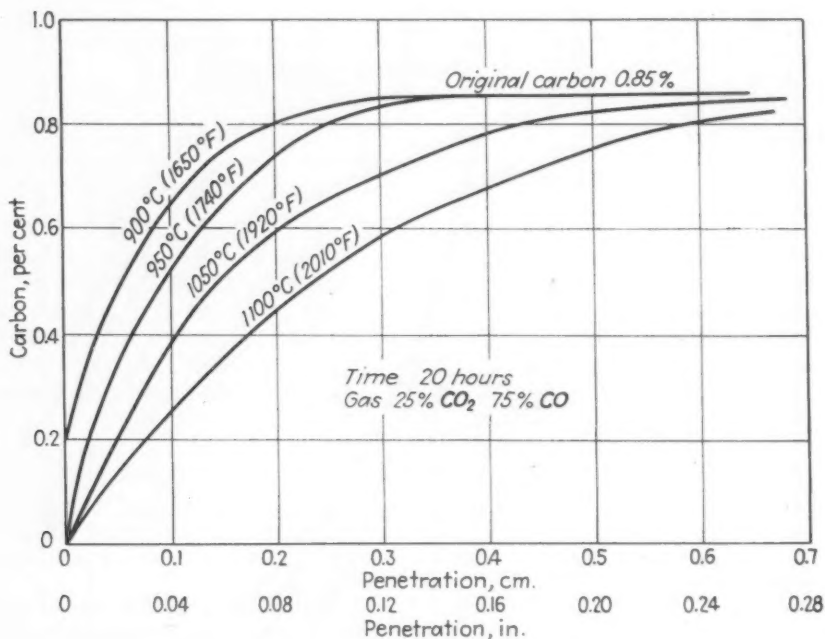


Fig. 14—Effect of temperature on decarburization.

bon and calculating the corrected time. A point is taken at a concentration of around 0.7 per cent C in order to establish the actual time required to get the surface carbon down to zero per cent.

Once the corrected time is known, the calculation of C is carried out for different values of x of Equation 32. This leads to a good approximation of the decarburization curve. However, if accuracy is desired, the diffusion coefficient as a function of the carbon concentration must be considered by using Equation 30. When the correct diffusion coefficient of carbon has been established at the various depths, the coefficient is resubstituted in Equation 32 and the actual carbon content at the depth is found.

Effect of Time and Temperature: Since decarburization depends upon the diffusion of carbon to the surface, equations which were used to describe the effect of time and temperature during car-

burization, the variation of the curves with time and temperature has not been plotted.

Effect of Grain Size Upon Decarburization: Among heat treaters, there is the belief that carbon diffuses more slowly in fine-grained steels than in coarse. The work of Rowland and Upthegrove⁶⁴ on decarburization seems to substantiate this. Microscopic examination revealed ferrite zones of variable grain size, and steels with the largest grains were found to be more deeply decarburized. Careful consideration of this paper by Rhines and Wells¹⁹ led them to believe that other influences were operative; they felt that Rowland and Upthegrove's samples suffered a redistribution of carbon during the cooling from the annealing temperature. Checking their assumption on a fine and coarse-grained steel under identical conditions, they were able to detect no difference in ferrite band thickness.

Rhines and Mehl also made tests

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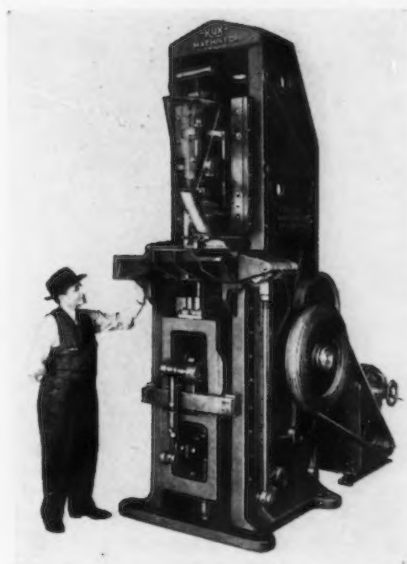
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Automatic Press for Powdered Metal

KUX MACHINE CO., 3944 West Harrison Street, Chicago, has introduced a new automatic press, Model No. 74, which is said to be one of the largest machines of its type ever built, for producing parts from powdered metals and ceramic materials.

Oilless bearings, iron gears and cams, metal filters, metallic electrical contact points are only a few of the products which may be formed on this press from powdered iron, bronze, aluminum, platinum, etc. Ceramic parts such as radio tube bases, insulators of all types, coil forms, fuse plugs, etc., are easily and simply made, from steatite, porcelain and other ceramic materials at speeds of up to 25 pieces a min.

Applying up to 50 tons total pressure, this machine will produce parts as large as 5 in. in diameter and has a powder cell, or die fill, of 5½ in. maximum. It is completely



THIS new automatic press for producing powdered metal parts weighs about 13,500 lb. Its one-piece steel cast main frame stands 11 ft. high.

automatic in operation.

Model No. 74 has been designed so that its multiple telescoping punches and movable core rods, which apply the pressure to the material being formed, can be operated individually.

Use of upper and lower movable core rods permits the forming of intricate and odd shapes of parts, for additional pressure can be applied to an extending lug, to a countersunk hole, or to a heavier section where the additional pressure is required to obtain uniformity of density. A side core pull mechanism is also provided so that parts having holes or indentations through one of their sides, can be formed.

Both upper and lower punches, held in flange-type punch holders, are mounted to heavy steel punch carrying slides which operate in V gibs, adjustable for wear. Both punches can be shifted slightly for perfect alinement with the die.

Hard Chrome Plating

HARD usage of all kinds of equipment in the war effort and the increasing difficulty of getting replacement parts has given a tremendous play to the use of chrome plating in salvage work. The constant use and the rapid wearing out of machine tools, for example, the delay in getting new parts and the fact that many standard machines have been altered to meet requirements of some manufacturers, combine to make it necessary to use some means of building up worn parts on these machines. Such machines as grinders, milling machines, screw machines, boring mills, etc., can be repaired by the use of a deposit of hard chrome. The same is true of other industrial machinery, includ-

ing shafts of motors and generators, couplings and gears.

Many worn parts of trucks and motor cars, in extreme shortage today, can be salvaged by the use of hard chrome. Many parts for the aircraft industry are being chrome plated. Gear quadrants for carburetor controls, for instance, are being lightly chrome plated on the teeth to eliminate any backlash that may be present even after precision grinding of the teeth. The thickness of plate can be very closely controlled.

Some manufacturers of gages are now producing gages for the industry with 0.001 to 0.002 in. thickness of chrome on the wearing surfaces. This prolongs the life of

the gage, due to the chrome being harder than the steel, a chrome plated gage is usually more satisfactory because it does not have the same tendency to stick or drag in use. Plated gages act much the same as if they were lubricated.

Forming dies with approximately 0.001 in. of chrome on the working faces last much longer and work much better. They have less tendency to score and scratch the work, and if they eventually wear through the chrome, they can be stripped and replated. In this way the die has a much longer life than otherwise.

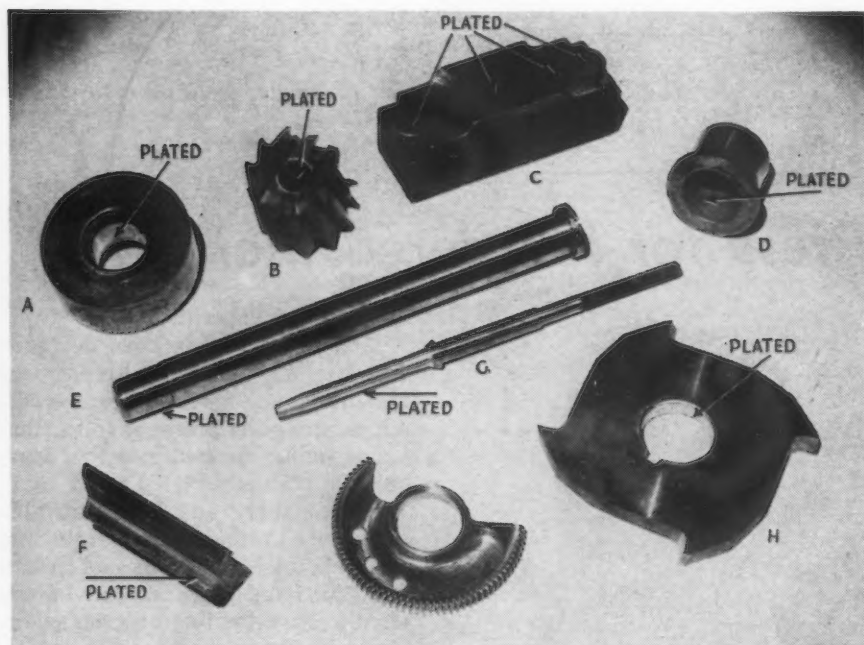
Draw dies and forming rolls are being plated also. In some instances production is set up so the tools are used for a stipulated number of hours, feet or pieces, at which time they are stripped and replated. In this way, the work is all done on the chrome surface and the tool itself lasts almost indefinitely, resulting in a vast savings in cost of tools and material.

Many tool designers also specify chrome on jigs and fixtures where there is a tendency to wear, such as on cams, locating faces, etc.

Hard chromium plating is not new. The Nicholl Hard Chrome Service, Detroit, has been doing this sort of work for the past 15 years. However, there has been a gradual increase in the use of chrome plating both in original design and for salvage purposes. Many operations which in the earlier stages were termed by shop men as unsatisfactory have since become standard procedure.

Heavy Thicknesses Detrimental

In the first few years of hard chrome plating, most users were unfamiliar with chromed tools and specified greater thickness than are advisable. As a result, the early failure of chrome plated tools retarded the advancement of the process. Even today it is difficult to get all users of hard chrome to specify a thin deposit but a marked improvement in this respect has



A—Drawing die—Plated 0.001 in. thick on i.d. to increase life; no grinding after plating.

B—End mill—Plated in i.d. 0.005 in. thick due to being ground over size. Must be ground after plating.

C—Forming die section—Plated on formed surface 0.001 in. thick to increase life and reduce tendency to scratch or tear the metal being formed; no grinding necessary after plating.

D—Bushing—Plated 0.002 in. thick due to being ground oversize in the i.d.; regrinding necessary.

E—Forming punch—New part, plated to increase life, 0.001 in. thick; no grinding after plating.

F—Form cutter—Plated 0.005 in. thick on side of dovetail due to being ground undersize; regrinding after plating necessary.

G—Alining gage—Plated on o.d. to increase life, 0.004 in. thick; regrinding after plating necessary.

H—Cutter—Plated in i.d. due to being ground oversize, 0.003 in. thick; regrinding necessary.

For Wear Resistance and Salvage

By STANLEY H. BRAMS
Detroit Editor, THE IRON AGE

been noted in the past year, perhaps due in part to the shifting of personnel from one shop familiar with such processes to others unfamiliar with them.

Chrome can be deposited in almost any thickness required from 0.0001 in. or less up to 0.025 in. or more, but in most operations 0.001 to 0.002 in. thickness is the most satisfactory. The main purpose of the heavier deposit is to provide grinding stock for finishing after plating on parts machined undersize, or to salvage machine parts and tools ground or worn undersize to such an extent that they require a heavy deposit to return them to original size.

To resist wear, tools such as dies, drawing mandrels, burnishing tools, etc., are more satisfactory if plated to the correct size than if plated larger and ground to size. It has been found that plating to a thickness of 0.001 or 0.002 in. produces a surface which does not have to be finished. Additional plating gradually causes the surface to assume a microscopically bubbly contour, requiring grinding after plating.

Nicholl has several very interesting case histories. A drawing die, used for drawing a tube, had a life of from 2 to 5 hr. at one production shop. The difficulty was caused by the picking up metal from the product being drawn, scoring the die, damaging both the part and the tool as well. It was chrome plated to a depth of 0.001 in. The life of the tool was increased to a day or more of work, sometimes two days. Also, the speed of the drawing operation was increased to sometimes double on the same size. On one size, a drawing speed of 70 surface ft. per min. was stepped up to 140 s.f.m.

Punch Press Dies

Another example is a deep drawing operation on press work. Without chroming, tools would wear and parts would stick and scoring would occur. Scrap was high and replacement was necessary. A standard practice has been set up in this

operation, in which die and punch are plated to a depth of 0.001 in. After wear of 0.0005 in., the chrome is stripped and it is replated. From five to 10 or more replates are possible on the same tool. The dies cost about \$15 to \$20 in this application and the punch runs probably from \$12 to \$15. Before chrome was used, replacement was necessary on these parts after a short time in use. By chrome plating them their life is extended several times at a cost of approximately \$2 or \$3 for each chrome plating operation.

An interesting additional example of work being done by Nicholl revolves around a complicated thread gage with many dimensions, slots, fingers, etc., the cost of which can be estimated around several hundred dollars. The gage was machined in error in one of the finishing operations. For a fractional charge the face which had been ground undersize was saved.

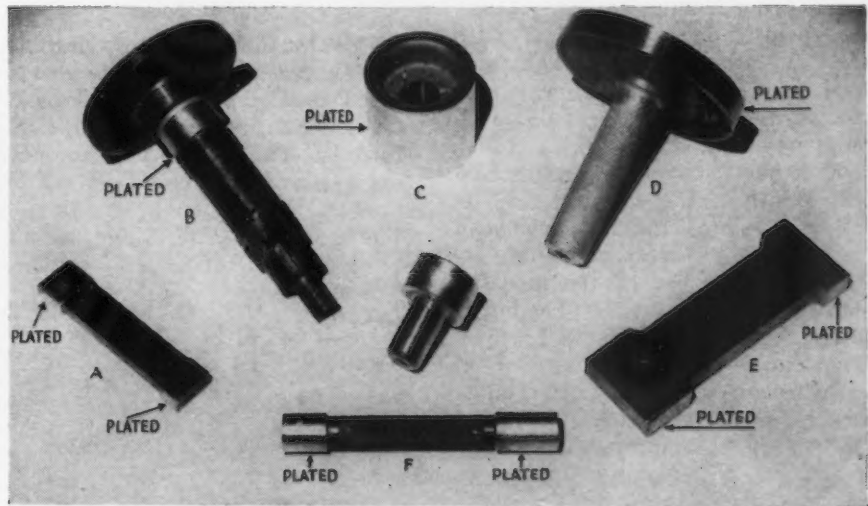
Tools or parts, such as shown in the illustrations, come into the

Nicholl shop and are first masked all over except where the chrome plating is to be applied. The work is the cathode. The anode is a metal form designed and shaped so that the proper amount of current will pass through the part being plated. The shape, material and spacing is determined by the nature of the work being plated. The part and the anode are then put in the bath and remain there approximately an hour for every 0.001 in. to be chromed. Incidentally, all pieces come into this shop with specifications as to the dimension to be reached by chroming. All grinding is done at the shop of the company buying the work or at another outside shop. Sometimes the specification calls for oversize plating to permit grinding down to exact size; sometimes it calls for plating to final size.

All types of tools and machine parts are being salvaged at Nicholl by the use of chrome, such as dies, shafts, gears, milling cutters, ream-

(CONCLUDED ON PAGE 104)

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A—Flat gage—Plated 0.005 in. thick where marked, due to being undersize. Regrinding necessary.

B—Splined shaft—Plated 0.004 in. thick where marked, due to having been machined undersize; regrinding necessary.

C and D—Plug gages—New gages plated 0.004 in. thick on o.d. to increase the life of tool; regrinding required.

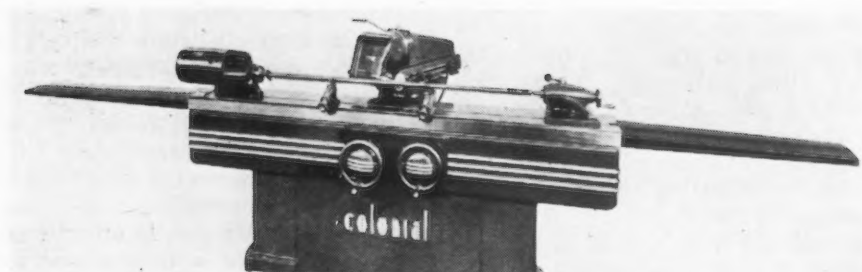
E—Flat gage—Plated 0.005 in. thick where marked due to being worn undersize; regrinding required.

F—Double end plug gage—Plated 0.004 in. thick on o.d. of both ends, new part, plated to increase its life; regrinding necessary.

New Equipment . . .

Machine Tools

Some of the many design improvements and construction advances in milling machines, centering machines, turret lathes and other vital equipment made by machine tool builders are described herein.



A NEW universal broach sharpening machine, for sharpening either round or flat broaches, is announced by *Colonial Broach Co.*, Detroit. The sharpener is designed to accommodate flat broaches up to 65 in. in length between end teeth and round broaches up to 72 in. between centers and 6 in. overall diameter. The change-over from round to flat broach sharpening is accomplished with few adjustments and without special tools. The ends are extended outward to provide a full-length support from the working table, which has an overall length of 99 in. Width of the working table is 11½ in. The grinding wheel head is mounted on a vertical column attached to the bed of the machine with replaceable V gibs. The maximum vertical travel is 12 in. The grinding wheel spindle is mounted on preloaded precision ball bearings and is belt driven at various spindle speeds up to approximately 7500 r.p.m.

A feature of the sharpener is the use of two handwheels to provide three movements of the grinding wheel head and work table. Rotation of the handwheel on the right moves the table to the right and left under the grinding wheel head. The left handwheel has two positions, "in" and "out," one controlling the horizontal feed of the slide

for grinding wheel head and the other controlling the vertical movement of the head. A quick-action lever provides a rapid traverse action for the horizontal slide. For cylindrical broach sharpening the headstock is provided with a 1/3-hp. motor with two spindle speeds of 200 and 400 r.p.m. obtained through gearing.

Thread Miller

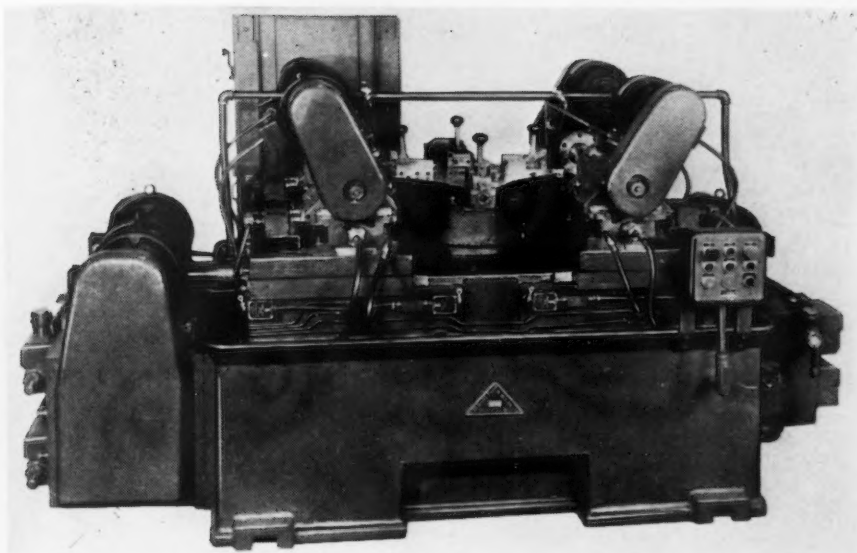
TWO models of a newly designed thread milling machine are offered by the *Hill-Bartelt Machine Co.*, 229 South Church Street, Rockford, Ill. The illustration shows the single-purpose machine set up for production runs on a specific job. The other is a general purpose ma-



chine with adjustments permitting change of set-up for a wide variety of work. The single-purpose model can be made up for cutting either right-hand or left-hand external or internal threads, using a multiple type thread mill. Feed is accomplished with a cam, synchronized with the work spindle, which governs the complete cycle, including rapid return and a dwell for reloading. Work up to a capacity of 3 in. diameter is held in an air-operated collet chuck. Controls include start and stop buttons for motors, feed clutch release lever and the chuck-operating handle. On the general purpose model, the cutter head has a tilting adjustment for alining the cutter with the helix angle of the thread. Either single or multiple type cutters may be used. The machine will cut threads from 5 to 32 pitch, up to 9 in. in length with a single cutter and up to 2 in. in length with a multiple cutter.

Hollow Milling Machine

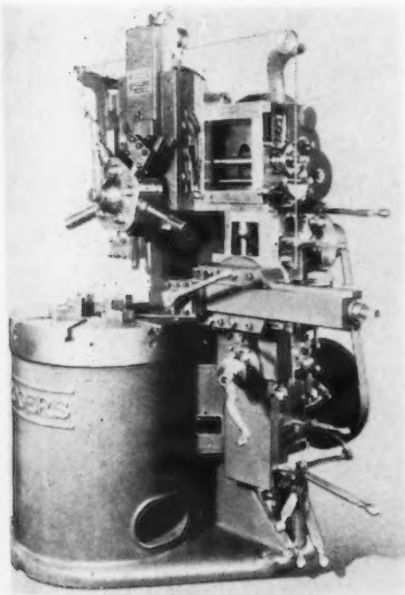
A SPECIALLY designed hollow milling machine is announced by *LeMaire Tool & Mfg. Co.*, Dearborn, Mich. It was designed for machining a round trunnion on each end of a turbine blade, and at the same time face the blade to length. An index table carrying four special toggle clamp fixtures occupies the center of the machine, with hollow mills on two sides operating on horizontal slides. Each slide carries two auxiliary slides on which the cutter heads are mounted. As the operator loads each piece, work is proceeding on the pieces already in the fixtures at the right and left of him. The base of the machine houses the coolant fluid and the in-



dex mechanism. Power for moving the slides is furnished by hydraulic units mounted on each end of the machine.

Vertical Turret Mill

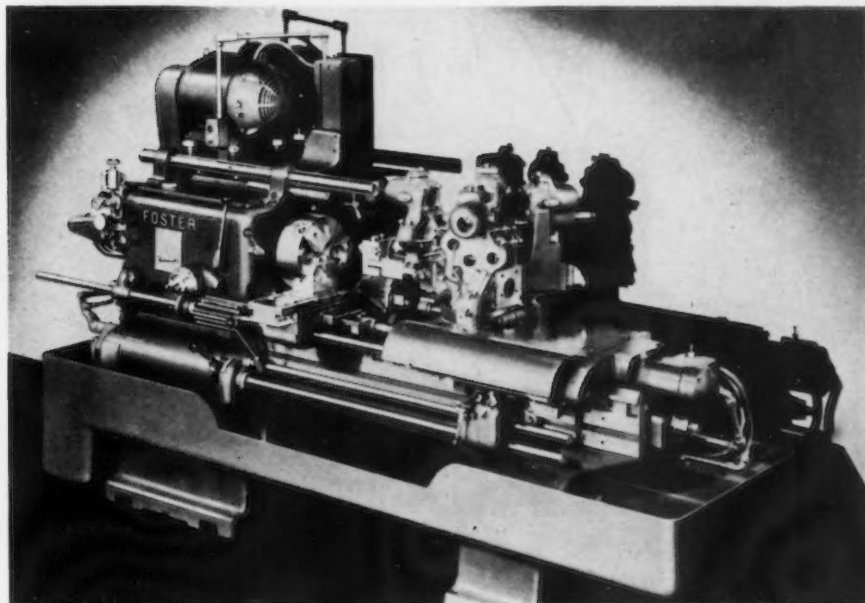
INCORPORATED in this high-speed vertical turret mill, made by *Rogers Machine Works, Inc.*, Alfred, N. Y., are standard Rogers features. A swivel side head that is adjustable at any angle each side of vertical up to 35 deg. facilitates quicker tool setting for irregular



shaped pieces. Built-in graduated dial saves time in making set-ups for original and second runs. Main drive sheave of the mill runs at 760 r.p.m. which is double the speed of the standard machine. The machine has a working capacity of 36 in. in diameter.

Special Driller and Tapper

A MACHINE for drilling, reaming and tapping holes in flanges of crankshafts has been announced by the *LeMaire Tool & Mfg. Co.*, Dearborn, Mich. Three horizontal spindles, spaced 120 deg. apart around a circle, can be spaced on any bolt circle diameter from 5½ to 10 in. By indexing the head in which these spindles are mounted, it is possible to drill flanges having 3, 6 or 12 holes. For drilling and reaming, the movement of the spindle head is controlled by hydraulic circuit. For tapping, the spindles are fed into the work manually. The right end of the machine is equipped with a fixture with removable adaptors, V-blocks and drill plates which can be set up to accommodate various models of crankshafts.



Automatic Turret Lathe

IN the new Foster Fastermatic turret lathes No. 1-F and 2-F, announced by the *International Machine Tool Corp.*, Foster Division, Elkhart, Ind., the entire machining cycle is automatic and the operator need only concern himself with loading and unloading the work. Fastermatics are equipped with a flexible hydraulic feed system which provides an independent feed for each face of the turret. Standard cams adjustable to control the various movements or change the operating speed are provided. The Oil-gear hydraulic unit is built into the machine as is the pump which operates the controls. Oil pressure adjustable from 300 to 1000 lb. per sq. in. is provided. Clean oil, free from abrasive particles, is assured in the hydraulic control system by means of an oil filter. Ample power for the hydraulic feed of the turret is provided by one large hydraulic cylinder mounted at the end of the bed. The motion of the hexagon turret slide provides the necessary feed to the front and rear cross slides by means of cams. The forward and reverse movements of the hexagon turret slide indexes the hexagon turret and cam roll. Spindle speed is controlled by pick-off gears, with three automatic changes on the 1-F and four automatic changes on the 2-F. Speed changes may be made at any time while the machine is in operation. By means of a thermostatically controlled heating system, a constant headstock temperature is maintained for precision spindle alignment with the turret hole centers.



Unit Head Miller

A SPECIAL machine has been designed by *Snyder Tool & Engineering Co.*, Detroit, for milling valve clearance pockets in aircraft engine pistons. Production was projected at 100 pieces per hr., at 85 per cent efficiency. Indexing is by means of a standard 3-station Geneva index mechanism. A heavy, index positioning pin enters the locating bushings automatically after indexing. The piston is positioned manually with a pin engaging the wrist-pin holes and is clamped by means of a simple cam action in the fixture. Operation is semi-automatic and is so arranged that after

loading the fixture, a push button must be pressed for each cycle. The work cycle consists of an index followed automatically by the infeed of the cutters into the work.

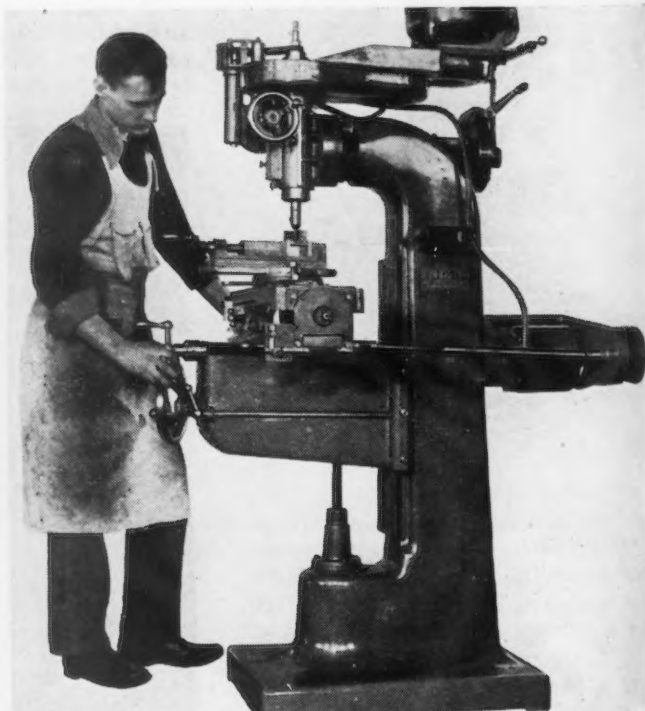
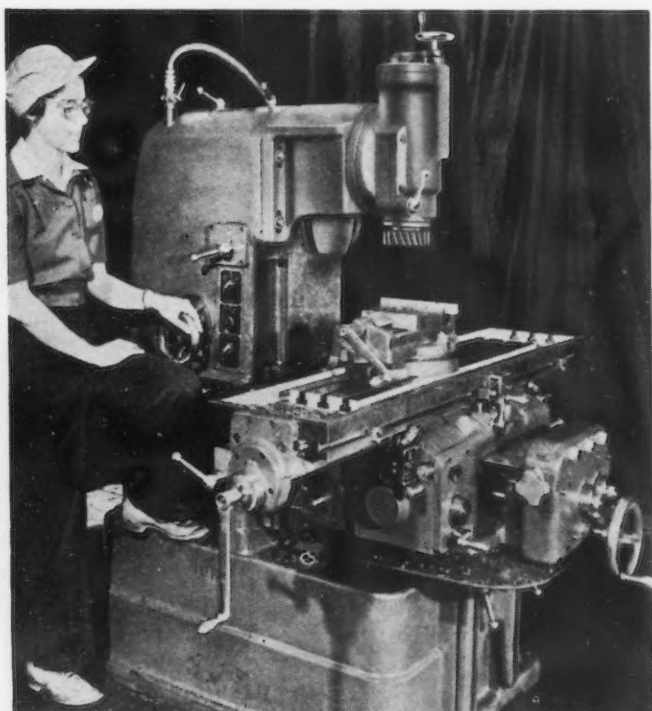
Universal Milling Machine

THE Lombard 30HV milling machine, made by the *Lombard Governor Corp.*, Ashland, Mass., is a universal type miller for either horizontal or vertical work. Spindle speed control is shown on a three band dial. Change from horizontal to vertical work is achieved by removing the arbor support clamp and arbor and sliding double overarms into column. Vertical head tapered

shank fits into the horizontal spindle and is held by a draw bolt. Bolt clamps also hold the head rigidly to the column and full power spindle speed is made by direct power gearing with double pulley V-belts. On the vertical set-up, cutter height is controlled by a micrometer reading lever at top of head, facilitating precision work without raising or lowering table. Features include a table equipped with six direction power rapid traverse with 100 in. per min. in both longitudinal directions, 50 in. per min. on cross travel and 25 in. per min. elevating travel. The vertical quill has 4 in. of feed as well as 360 deg. of angular adjustment.

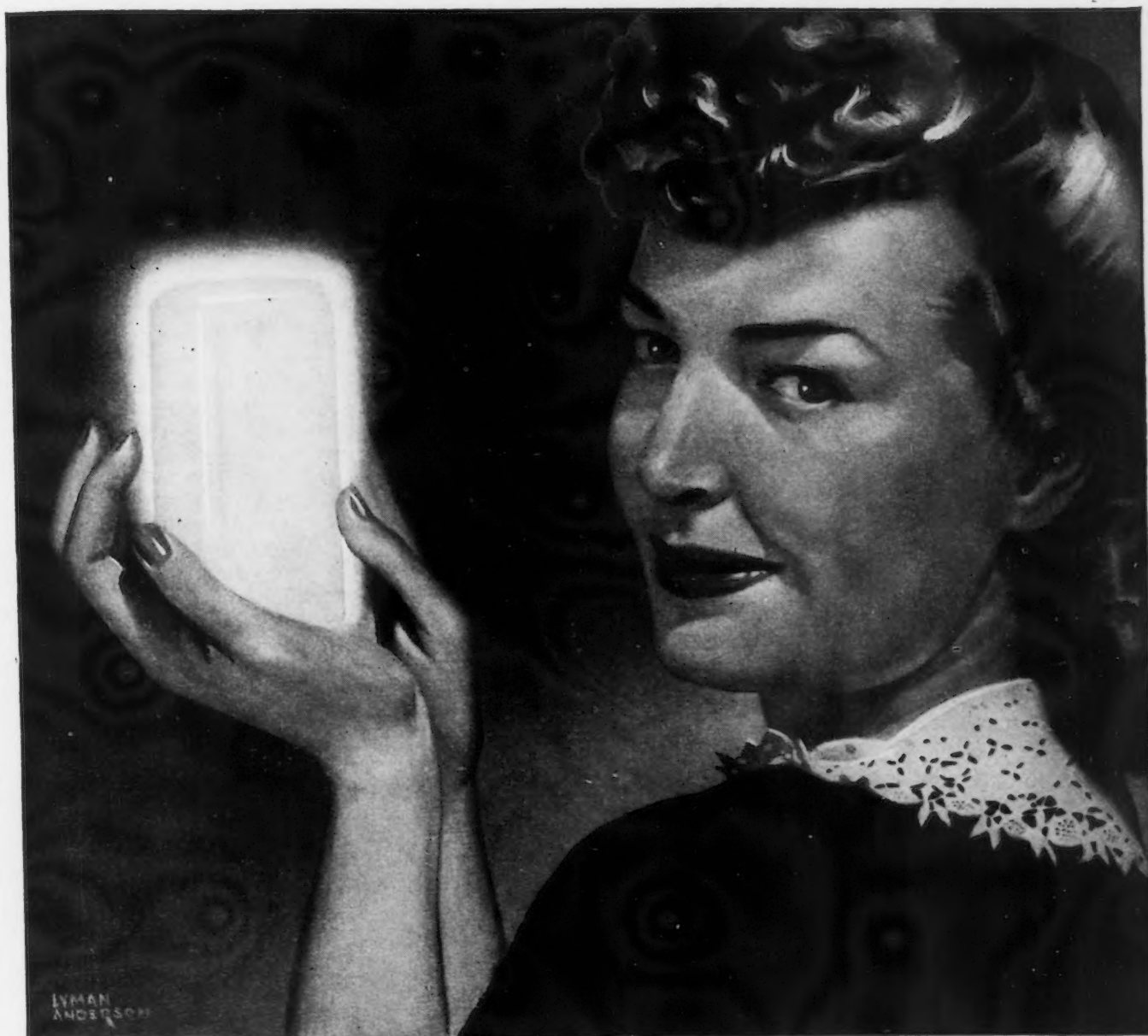
Vertical Milling Machine

A NEW model milling machine has been put into production by the *Index Machine & Tool Co.*, the sale and distribution of which is handled through *Blank & Buxton Machinery Co.*, Jackson, Mich. New patterns provide heavier column, knee, saddle and table. This machine is sensitive enough for jobs requiring end mills of approximately $\frac{1}{8}$ in. diameter and sturdy enough to take cuts up to $\frac{3}{4}$ in. in tool steel. It has a $3\frac{1}{4}$ in. quill travel with power feed. Spindle head swivels 90 deg. right or left. The table is fitted with verniers, both cross and longitudinal. A piece 8 x 16 in. can be worked, milled, drilled and bored straight or at angles all in one setting.



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The shape of things to come is no secret

THE humming noise you hear is industry at war. When peace comes, that sound need scarcely change its pitch. For in business offices, on assembly lines, in civilian defense centers, and at home, American women are already wishing up new things for industry to make.

They want us to help them keep house, to supply new equipment for it on a scale that makes past performances seem like only practice. Home laundries that "do" everything from tablecloths to negligees. Ranges complete with pressure cookers and unbreakable transparent ovens. Refrigerators with compartments that hold each food, from frozen meats to lettuce, at the ideal temperature and humidity.

Whatever makes housekeeping easier and more economical, women will be waiting for industry to supply. The problem is not what to make, but *how*. Which material, new or old, will contribute the most in beauty, strength, economy, to each part of the new design? How shall it be used, fabricated, finished? Where can it most effectively save weight, cost, time?

For impartial answers to questions about metals industry can turn to Revere. For just as industry in the future will not be restricted to the traditional materials, neither will Revere. In addition to broadening still further the uses for copper and its alloys since the start of the war, Revere has developed facilities for the manufac-

ture of the light metals, and is pioneering in the production of entirely new alloys with important properties that can cut manufacturing costs for many industries.

Today the copper industry is working all-out to win the war. No copper is available for anything else. But post-war planners with specific problems in metals are referred directly to the Revere Executive Offices in New York.

REVERE

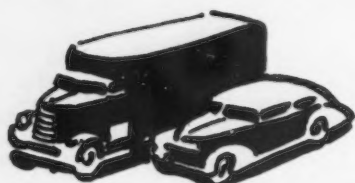
COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

Executive Offices: 230 Park Ave., New York

Assembly Line . . .

• Tool salvage exhibit develops new ideas at General Motors; carbide tips used for gage wear surfaces . . . Auto union seeks more pay raises and an end to "Little Steel" wage formula.



DETROIT—The words "tool salvage" take on a new significance on the 15th floor of the General Motors Building. There the corporation has gathered exhibits from its various divisions, showing just how far salvage can go and how substantial a saving it can provide.

For most part, General Motors divisions salvage tools by silver soldering them, by brazing them or by flowing metal onto them to build up worn or chipped spots. But that is little more than a starting point, for the ingenuity which has been displayed goes well beyond such expedients. It is estimated by H. T. Johnson, director of the standards section of GM, that the average cost of such salvage work represents little more than 10 per cent of the replacement cost of the tools. As a result, he expects intensive tool salvage probably will con-

tinue by the divisions as a permanent measure, regardless of post-war availability of tool steels and other materials. The exhibit is being enlarged daily and has been the object of keen and detailed inspection by representatives of other companies of the automobile industry.

For example, the length to which a dovetailed turning tool can wear depends in major degree on the dovetail. As its length diminishes it is apt to split off. General Motors has moved to meet this problem by grinding off the dovetail entirely and welding a steel section on to the tool portion which extends beyond the non-cutting end and backs up the cutter itself. The base of this section is then machined into a new dovetail whose length runs along not only the tool itself but along the back-up section. Wear on the cutter section can then be extended to virtually its entire length.

Another example of dovetail saving finds thread chasers welded together end to end, giving required length to the dovetail.

COMBINING cutting tips with shanks of less critical material is commonplace in the exhibit. High speed steel tips are brazed on carbon steel shanks. Tungsten tips have been brazed on to cast iron shanks, and work out remarkably well. Ordinary carbon steel has been used for a shank for stellite, puddled on. One division reveals that it anneals and forges counterbores to form standard tool bit stock.

There are countless examples of

cutting tool reclamation. A broken drill was made into a special step drill. Hobs have been annealed and worked into milling cutters. Fellows gear shaper cutters have been reground into milling cutters. Undersized tips on milling cutters have been reground to form counterbores, reamers and chamfering tools. In one case the end of a drill is used as a base to which is welded a section from another broken drill. Any number of examples can be found where metal is flowed in under a torch onto the stubs of broken teeth of cutters to form a cast section which can be machined to proper size and shape.

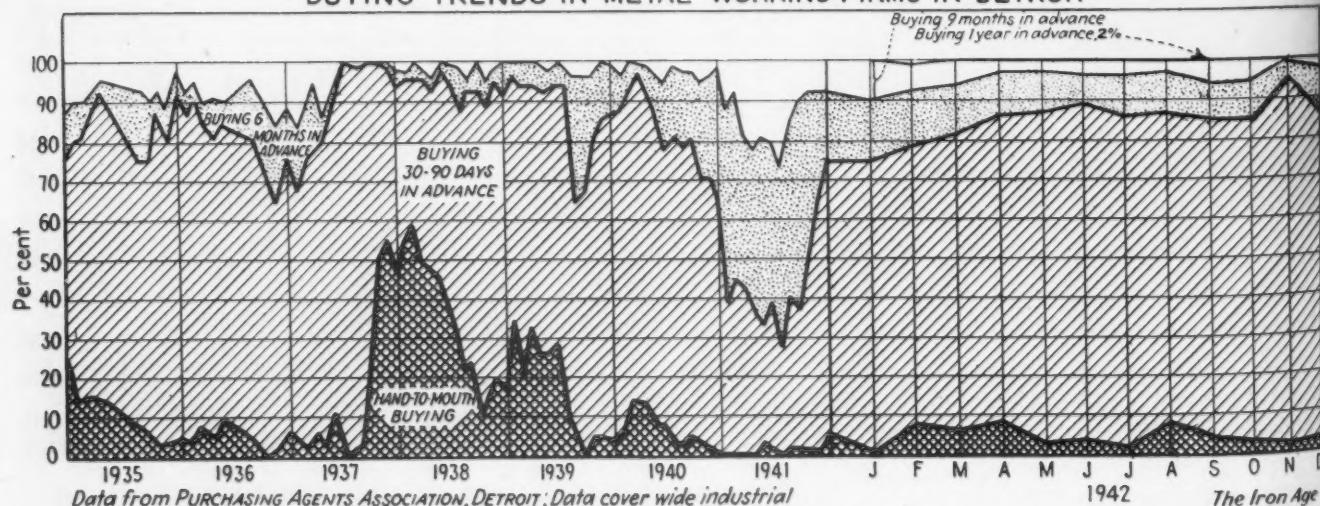
Two means of salvaging ends of honing stones are shown. In one, honing stones, well worn down, are turned at right angles to their original surfaces and joined onto a base in pairs. The width of the stone is then equivalent to original width, and depth is somewhat greater. The paired stones, both of which would have been discarded in less stringent times, then have a life equal to a brand new stone. In another example honing guide strips are restored to usable thickness by soldering a steel back onto them.

Also notable is a most interesting display of gages which have been reconditioned by inserting standard tungsten tips into the worn gage surfaces of snaps, plug and ring types. The tips are spotted at critical surface areas and their hardness is said to multiply gage life by 10 to 40 times the life expectancy of tool steel gages. Cost, on the other hand, is about three times that of tool steel gages.

ONE other special development in this exhibit is a display of a rubber bushing installation designed

THE INCREASING AREA of 30-to-90 day buying, indicated by diagonal shading above, is only partially indicative of the recent tendency notable in Detroit buying circles to purchase somewhat farther ahead. Hand-to-mouth buying was much lighter during the last half of 1942 than in the first half. There seemed an increasing concentration as the year went along to centralize buying in the 90-day zone, at the expense of both 60-day and 6-month forward ordering. Buying on a 90-day basis has been regularly accounting for nearly two-thirds of Detroit purchasing since last summer.

BUYING TRENDS IN METAL-WORKING FIRMS IN DETROIT



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You can't ask a gunner to watch his step

Uncle Sam braces gun crews for battle on "A.W." Rolled Steel Floor Plate. Guards against dangerous slipping and falling accidents. "A.W." Floor Plate protects men essential in the war effort wherever they may be—in war production plants, refineries, power plants; in tanks, troop-carrying trucks and on shipboard. Toughest wear will not damage or impair it. Ends floor troubles for good. Write for folder.

ALAN WOOD STEEL COMPANY

MAIN OFFICE AND MILLS: CONSHOHOCKEN, PENNSYLVANIA : SINCE 1826. District Offices and Representatives: Philadelphia, New York, Boston, Atlanta, Buffalo, Chicago, Cincinnati, Cleveland, Denver, Detroit, Houston, St. Paul, New Orleans, Pittsburgh, Roanoke, Sanford, N. C., St. Louis, Los Angeles, San Francisco, Seattle, Montreal.

to minimize breakage of small drills. Such drills very often break when going through the extreme end of the work, evidently due to the sudden freeing of the torque resistance. To meet this problem, development engineers experimented with a rubber bushing into which the drill itself fits—the bushing being one which can be ground out of soft rubber in any shop. Screw pressure is applied on this bushing through a plunger, compressing the rubber to a very tight fit. The entire holder body is then chucked. Breakage on one size of drill used on

by some 30 per cent since Jan. 1, 1941, base date of the Little Steel formula, and that further rises were in prospect, as evidenced by the statement of OPA Administrator Prentiss M. Brown that he expects a raise of 6 per cent during the next 12 months.

The CIO board is meeting tomorrow, Feb. 5. Undoubtedly it will draw up resolutions seeking pay boosts nationally, and can be expected to chart a campaign toward that end. The first step which can be expected will be to bring pressure on WLB to invalidate the Little Steel formula,

now until doomsday; such herring-dragging will not alter the fact that the ability of factory workers to obtain pay raises at regular intervals is certainly one of the motivating factors in the unwillingness of the rural legislators to bind their constituents to rigid profit limits. Increases of industrial wages, whether as cause or effect, have brought higher costs of living along with them; there is no reason to suppose that a further raise will mark the end of the cycle.

Meanwhile, non-industrial employees suffer. The situation is epitomized by the remark of a woman office worker made on a street car in a discussion of the UAW-CIO demands. "What are we to do?—unless the stores have one set of prices for UAW members and another for us?"

Pay raise demands by the unions likely will be accompanied by a resumption of the never-dying union drive for a place at management's table. The latest union move in such a direction is oblique; it is heralded in announcement of a new Walter Reuther plan, this one seeking a guaranteed work-week of 40 hours, to be increased to 48 hours within 60 days.



PATH OF LIGHT: High in the blacked-out Texas sky, a student from the Harlingen Army Gunnery School drills a path of light into the night with tracer bullets. Harlingen gunners learn to protect Air Force bombers at all times from enemy fighter planes.

alloy steel aircraft has been reduced 50 per cent by this device, it is said.

The exhibit goes beyond tool steel in its reclamation possibilities. Shown, for instance, is a malleable iron head which is used instead of brass for hammers, found very satisfactory in those light applications required. Also shown is a hack saw blade of garden variety, costing \$1.35 apiece, which has been reconditioned for 27 cents by grinding.

One division salvages scratch brushes used to strip insulation from wire, by grinding them down to smaller diameter, after which they have the same efficiency they had originally in their larger size.

Pay raise problems lie ahead for the automobile industry and, in fact, for all industry. Following a declaration by CIO President Philip Murray a fortnight ago that his organization would soon seek rate boosts, R. J. Thomas, auto union president, made forthright demand for such action last week.

Mr. Thomas called for scrapping of the Little Steel formula promulgated last summer by the War Labor Board, of which he is a member. He maintained that living costs had risen

either by discarding it entirely or amending the 15 per cent proviso in it.

IN the auto industry, the Chrysler contract now is under discussion. The General Motors agreement can be opened for discussion on 60 days' notice; the pay arrangements in the Ford contract are subject to reopening on evidence of a significant change in the cost of living.

The seeking of further pay raises is logically spearheaded by UAW-CIO, as the most militant of the CIO unions, but it does not come from that quarter so logically in the face of the facts. Automobile workers are being paid upwards of \$50 per week on an average; any additional advances of the sort indicated as justifiable by UAW would bring the level into the \$60 range.

Immeasurably more important than the wage rates of automotive plant workers, too, is the effect of a raise on the economics of the nation. The story has been told too often to be repeated here, of how wage boosts speed up the inflationary cycle. The UAW can denounce failure to establish ceiling prices on farm products from

IN urging the War Manpower Commission and the WLB to undertake such a step, Mr. Reuther also seeks initiation of a national wage policy which will provide at least 40 hours' pay for employees, regardless of the length of their working period. Further, the WLB would institute an industry wage stabilization plan and create a "tri-partite" (government-management-labor) wage commission in the automotive and allied war industries to work out and administer a master wage agreement based on the principle of equal pay for equal work.

Demands for management functions have been made in the past by labor on the grounds that the unions would then be better able to exercise control over their members and would thereby iron out work stoppages and slowdowns. This was the argument, too, underlying closed shop demands. But the argument has failed in actual practice, as may be seen in the Ford Motor Co., where an international union administrative committee had to take over the functions last week of the deposed leadership of the maintenance unit labor group at River Rouge—a leadership suspended because of its inability or unwillingness to stop wildcat striking. Here was a closed shop in operation, and yet Ford has had several labor problems all during 1942 which have played a definite factor in impairing production schedules.



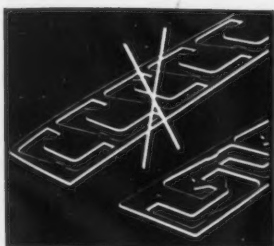
YOU CAN START *right here!*

—to **BOOST** output of *Stainless parts* and **REDUCE** *Stainless Steel scrap loss!*

TODAY, there are two big questions in the minds of users of Stainless Steel . . . "How to increase production of *Stainless parts*?" and "How to reduce *Stainless Steel scrap loss*?"

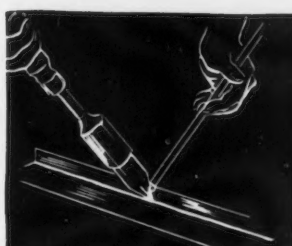
Useful hints to help you answer both questions are on these pages. Read them carefully. Use them to help you do a trouble-shooting job in the production of *Stainless parts*. Add them to your own "know how" that has come from working out *Stainless fabricating problems*.

These suggestions are a result of the work Carpenter metallurgists and service men have done in many plants where *Stainless* is used. Much of their experience is now being made available to you in printed form. And through correspondence with the mill, you can get still more help with your specific problems involving the use and fabrication of *Stainless Steel*.



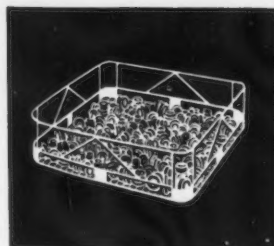
Re-check Your LAYOUTS

Another way to conserve *Stainless Steel* is to re-check layouts on jobs that are stamped from *Stainless Strip*. The results will be well worthwhile, in terms of metal conserved and time saved. In some plants, skeleton scrap losses have been reduced by as much as 20%.



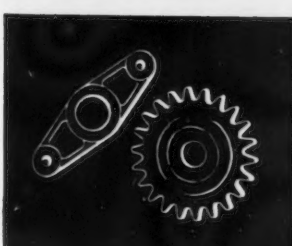
Are You **SOLDERING** *Stainless*?

If so, remember that heat is absorbed more slowly by *Stainless*. Thus, a **larger and heavier** iron should be used. It is not necessary that the iron be hotter, just **larger** with more heat capacity to allow the solder to flow more freely. **Thorough cleaning** of the *Stainless* surface before soldering is a **must!**



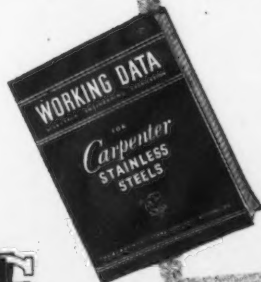
When **HEAT TREATING** *Stainless*

. . . be sure that all *Stainless* parts are absolutely clean—free from any grease or foreign matter—before putting them into the furnace. This will help you avoid excess scale, and cut pickling time to a minimum. And remember that medium or heavy sections are **soaked** at the hardening temperature.



Watch **FORGING** Temperatures

Always run furnaces at the recommended forging temperatures, not hotter. To keep operations going full speed, it may be possible to heat **more bars** and billets at the same time. *Stainless Steels* heat more slowly than other steels. **Thorough heating** of *Stainless bars* can help to reduce rejects considerably.



Here is practical engineering information to help you get the most from every pound of *Stainless Steel*. This 98-page book, "Working Data for Carpenter *Stainless Steels*", contains helpful fabricating hints. It provides data about *Stainless Steels* to solve heat or corrosion resistance problems.

This Working Data book is available to users of *Stainless Steel* in the U. S. A. If you would like a copy, a note on your company letterhead will start one on its way.



The Carpenter Steel Company, 121 Bern St., Reading, Pa.

Carpenter **STAINLESS STEELS**

BRANCHES AT Chicago, Cleveland, Detroit, Hartford, St. Louis, Indianapolis, New York, Philadelphia

Washington . . .

• **Prejudgment of CMP scored . . . Not yet in operation it deserves fair test . . . Given WPB approval after careful study . . . Industrial responsibility for success emphasized.**



WASHINGTON—Talk in industry and government about the possibility of failure of CMP before it has gone into operation is challenged by observers here as being not only premature but illogical. Premature because the plan has not been given an opportunity to prove up and illogical because it is government and industry's plan and these factions are going to be responsible for its success or failure. It is assumed that both want to make it work.

CMP contains all of the elements of tried distribution systems, such as bulking, scheduling, flowing materials and the use of preference ratings to determine priority. Those who are against it must be against any system of government control in time of war. For CMP is a compromise embodying what the automobile manufacturers (now arms makers) wanted in the way of scheduling, what the steel industry wanted in the way of allotment, what the aircraft companies wanted in the way of scheduling components through designated prime contracts, and what component manufacturers, such as General Electric Co., wanted in the way of bulking of on-the-shelf items. These compromises were made deliberately and with the knowledge and approval of these industrial groups.

At WPB there is a fear that criticism of the plan might bury it under a snow of protests from trade associations, individual manufacturers and Claimant Agencies—the way PRP was buried. Actually this fear is groundless, business men point out, unless weak administration on the part of government and industry kills off

CMP the way PRP was killed. The only way CMP can be improved and kept alive is by adjusting it to the needs of both industry and government, it is said. WPB cannot know what industry's needs are unless kicks are welcomed and weighed. The converse is likewise true.

WPB also fears that criticism might bring about a change in systems, and government personnel administering CMP, to the confusion of industry and the embarrassment of the officials now carrying the ball. Industrialists agree that another system being shoved down industry's throat would be unpleasant and disturbing to production, but deny that criticism should be withheld if it is valid and helpful. No one knows what other system could be imposed.

Sanest views are that in the transition period there should be a tolerant and sympathetic attitude on the part of all concerned. There are going to be kinks in CMP but it should be realized that so far as this country is affected, cooperative marshalling of industrial efforts is a pioneering job, never before attempted on the present scale.

In this connection, WPB program

vice-chairman Ferdinand Eberstadt, whose responsibility CMP is, promised industry that CMP would be a "comfortable fitting suit, not a strait-jacket." Consequently, when industrialists say that CMP is not as simple as it might be, or complain about red tape, or complicated forms, their logical recourse is simply to ask for less furbelows. Industry shouldn't be fearful because Mr. Eberstadt has promised changes when needed.

It has not been reported that criticism is industry wide or government wide. It is said to be a sprinkling at this point. CMP has been well received in general, particularly by industry which co-sponsored it. Capacious criticism in WPB, Claimant agencies and industry, including the jitters on the part of some officials of WPB, has been expressed by the "little voices."

AT WPB there are some nostalgic memories about PRP. Its proponents say that it has begun to work in the first quarter. These men are sincere and are not all "long haired." They wonder why there should be a CMP if PRP could work. The answer is that PRP did not begin to "work" until there was some courageous cutting off of the froth of more priorities

WOMEN, WOMEN, WOMEN: This photo, taken in the interior of a section of the Washington Navy Yard, shows a long line of lathes operated by women workers. This is one of the first pictures which Naval officials have permitted to be made of the 1400 women working at the Navy Yard.



One New Ramix Bottom..Six More Destroyers

LAST JUNE a Ramix bottom was installed in a 130-ton open hearth. It replaced an old magnesite-and-slag hearth installed in 1926.

Complete records are available on both bottoms—so it is possible to compare accurately the cost of these two types of hearths. Refiguring the magnesite-and-slag job at June 1942 material, labor and fuel rates, the use of Ramix saved this company \$1,267.81 in out-of-pocket expense.

But more important to a shop engaged in war production is the time saving. The Ramix hearth took only 120 hours to build, heat up and make ready to charge the first heat,

compared to 397 hours for the conventional burned-in hearth. At \$60 an hour, the value of this time saving is \$16,620—a total dollar saving of \$17,887.81, thanks to Ramix.

More vital still, in the 277 hours of time saved, the furnace made 3,047 tons of prime steel. That's enough extra steel to build six more destroyers to help our boys win back the Solomons—or a hundred tanks to win the fight for Tunis.

Basic Service Engineers are always glad to help any steel manufacturer install Ramix hearths, make major repairs, or assist in solving any problem involving the use of basic grain refractories.

BASIC HEARTH



REFRACTORIES

BASIC REFRACTORIES, INCORPORATED

843 HANNA BUILDING

CLEVELAND, OHIO

*Ramix is manufactured in Canada, for sale outside U.S.A.
and Mexico, by Canadian Refractories Limited, Montreal*

Applications for controlled materials, on the other hand, will be made by nearly all manufacturers using controlled materials. Bills of material will be used in the preparation of requirements for submission to Controlled Materials Division and in making allotment to prime consumers. Only a few hundred manufacturing units in the country make up the prime consumers and their principal subcontractors.

benefit, but intends to make its demands for submission of them to WPB mild. WPB intends to estimate many requirements by multiplying bills of materials, using appropriate lead factors, by a production program for a repetitive item. Repetitive items will be treated this way when substantial amounts of materials are required.

AS stated previously, WPB is insisting that bills should be collected where production is repetitive and involves substantial amounts of materials. In other cases it is being recommended that one of the following methods of estimating requirements will save time and labor and give results which are possibly more accurate:

type" or average bills collected. Motors and compressors fall in this class.

In a number of industries such as those which produce electrical and industrial equipment whose output is miscellaneous, it has been found possible to make sufficiently accurate estimates of quantities of CMP materials required per dollar value of output.

Engineering estimates are said to be appropriate when production is non-repetitive, or the urgency of production is so great there is not time for the collection of bills.

Cited for Award

• • • The following additional plants recently received Army-Navy "E" awards for excellence in war production:

American Hammered Piston Ring division, Koppers Co., Baltimore.
Austin Co., Seattle.
Babcock & Wilcox Co., Augusta, Ga.
Borg-Warner Corp., Long Mfg. division, Detroit, and Pump Engineering Service Corp. division, Cleveland.
Burroughs Wellcome & Co., Inc., Tuckahoe, N. Y.
Clark Equipment Co., Clark Tractor division, Battle Creek, Mich.
Columbian Steel Tank Co., Kansas City.
Crouse-Hinds Co., Syracuse, N. Y.
Eclipse Counterbore Co., Detroit.
Foster Wheeler Corp., Carteret Works, Carteret, N. J.
General Electric X-Ray Corp., Chicago.
General Motors Corp., Inland Mfg. division, and Moraine Products division, Dayton, Ohio.
Granite City Steel Co., Granite City, Ill. (renewal)
Herman D. Oritsky Co., Reading, Pa.
Illinois Gear & Machine Co., Chicago.
Mathieson Alkali Works, Inc., Niagara Falls, N. Y.
Mid-State Mfg. Co., Waupun Plant, Waupun, Wis.
Miller-Parrott Baking Co., Terre Haute, Ind.
Oil Well Supply Co., Imperial Works, Oil City, Pa.
Oil Well Supply Co., Oil City, Pa.
Otis Elevator Co., Buffalo Works, Buffalo.
Phillips-Jones Corp., Barnesboro, Pa.
Rex Mfg. Co., Inc., South Eastern Avenue plant, and Western Avenue plant, Connerville, Ind.
Solomon, Goldstein & Portnoy Co., Brooklyn.
Southern Steel Co., San Antonio, Tex.
Talon, Inc., Plant No. 4, Meadville, Pa.
Tennessee Coal, Iron & Railroad Co., Ensley Works, Fairfield Steel Works, and Bessemer Rolling Mill, Birmingham.
Thibodaux Boiler Works, Inc., Thibodaux, La.
Unitcast Corp., Plant No. 1, Toledo.
Wadsworth Watch Case Co., Dayton, Ky.
Ware Shoals Mfg. Co., Ware Shoals, S. C.
Weatherhead Co., Cleveland.
Westinghouse Electric & Mfg. Co., East Springfield, Mass.
Wright-Manley Mfg. Division, American Chain & Cable Co., Inc., York, Pa.

MARITIME COMMISION "M"

Marinship Corp., Sausalito, Cal.

BY J. R. WILLIAMS



Attention Gage Users

IMMEDIATE DELIVERY

CLASS OF SERVICE DESIRED	
DOMESTIC	CABLE
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NIGHT LETTER	WEEK END LETTER
Patrons should check class of service desired; otherwise message will be transmitted as a full-rate communication.	

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Send the following message, subject to the terms on back hereof, which are hereby agreed to

TO ALL GAGE USERS
YOU ARE OFFERED IMMEDIATE DELIVERY
FROM COMPLETE STOCK ALL MODELS ALL
SIZES AGD ADJUSTABLE SNAP GAGES
STOP ORDERS SHIPPED WITHIN 24 HOURS
THE SHEFFIELD CORPORATION

WESTERN UNION MESSENGERS ARE AVAILABLE FOR THE DELIVERY OF NOTES AND PACKAGES

HOW TO ORDER

State Frame Model and Frame Size.
Stipulate whether gage is to be set
and sealed. Give complete marking
instructions if set and sealed.

FOR SPECIFICATIONS

SEE SHEFFIELD HANDBOOK No. 42-2

PAGES 150-153

THE **SHEFFIELD** CORPORATION
DAYTON, OHIO, U. S. A.



WEST COAST...

• **Voluntary pooled inventory plan developed by northern California steel warehouses finally approved by all government agencies involved and will be set up this month . . . May become model for solution of supply problem in other regions.**



SAN FRANCISCO—Steel warehouse customers in central and northern California soon will be able to lay finger immediately on any steel items they choose provided it is available anywhere within the area. Blessed by the War Production Board, the Army, the Maritime Commission and the Navy, a central inventory will be set up within a very few weeks, listing available stocks of all warehouses, industrial users, and government holdings. If this inventory plan proves feasible, it will serve as a model for a similar arrangement in other steel warehouse areas throughout the country.

Originating in amorphous objective several months ago as steel warehouse stocks, upon which this area is heavily dependent, became exhausted, the scheme has gradually taken definite shape, gaining adherents and new phases along the way. Expanding heavy demands by the booming shipbuilding industry around San Francisco Bay denuded warehouse stocks here more rapidly and completely than in other parts of the country, and this condition, coupled with difficulty in securing replacements because of geographical considerations, brought the trade to a critical position. This situation was viewed no less seriously by the military than by the trade itself, for, as a jumping off point in the Pacific combat zone, emergency steel demands must be met within the moment.

Following rejection for various reasons of other tentative schemes, including pooling of stocks, the central inventory information idea was advanced by the warehouses themselves, and won enthusiastic approval from representatives of the Naval construction office and the Army-Navy Munitions Board, it is understood. Careful investigation followed, of technical and functional problems involved, by the War Production Board, under the direction of Oscar Starr, deputy regional director and later by L. Edward Scriven, chief deputy regional director.

One of the most promising aspects of the scheme is that it will be under the direct operational control of private persons thoroughly familiar with the steel warehouse business. R. B. Courtelyou, recognized for many years as an authority on steel warehouse prices and trade practices in this section, currently serving as consultant to the Steel Recovery Corp., will return from Pittsburgh about Feb. 15 and direct the establishment

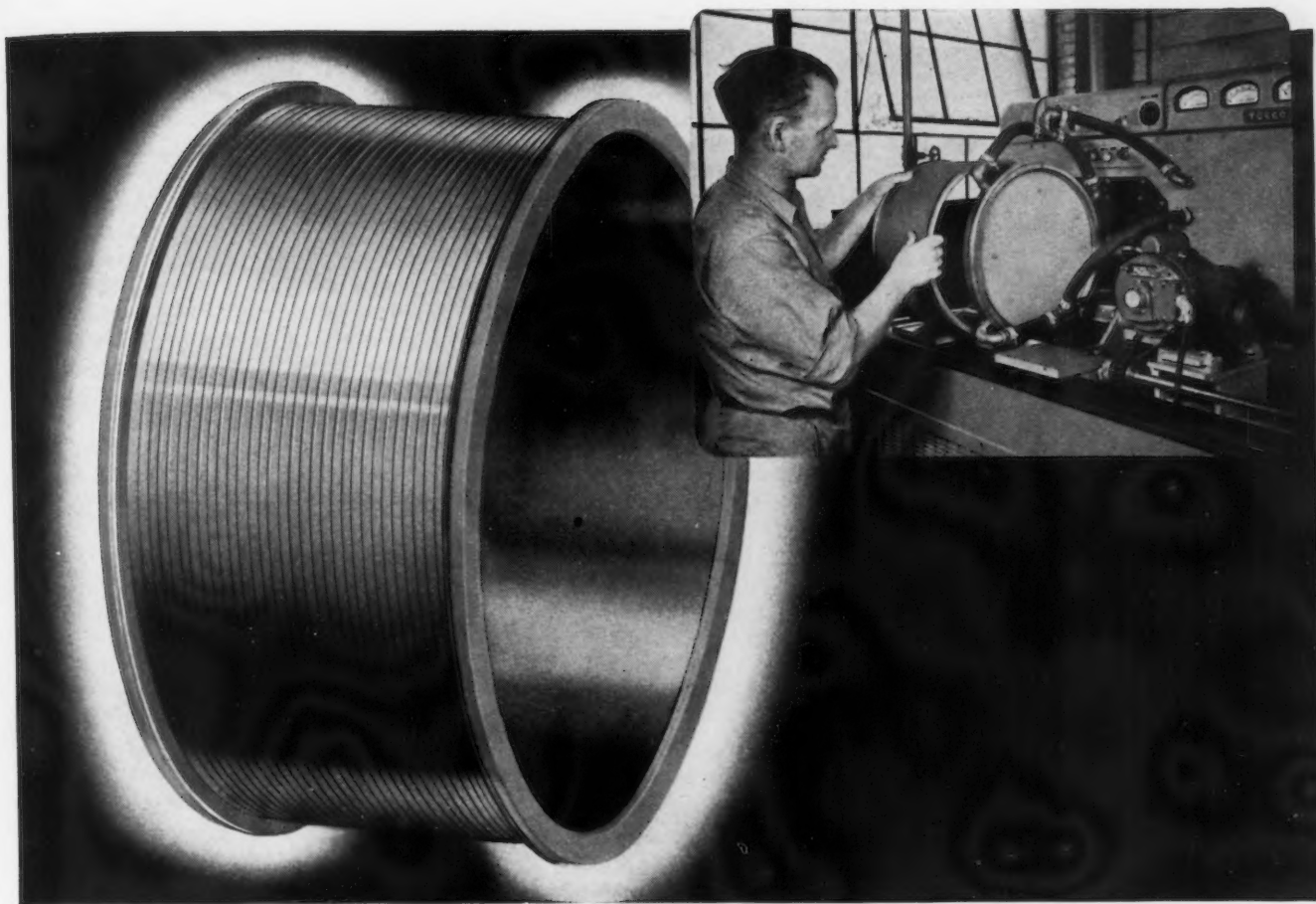
of the plan, to which he has been a principal contributor and enthusiast.

HOWARD TAYLER, member of the WPB steel warehouse advisory committee and chairman of the California Conference of Iron & Steel Industries, points out that the success or failure of the plan rests to a large degree upon cooperation of large industrial users in making available their stocks and inventory. However, in addition to warehouse stocks and voluntary listings by private industry, principally shipyards, the central inventory will have full access to stocks developed by the Steel Recovery Corp. and of excess inventories listed with the WPB Redistribution Division.

Certain operating details have not yet been fully worked out, it is understood. For instance, it is not indicated whether a given warehouse, unable to fill a customer's requirements from its own stock, will purchase from another warehouse indicated by the clearing house to have the material available, and then resell it to the

DOUBLE ASSEMBLY LINE: This scene won't give aid and comfort to the enemy. It's the double assembly line at the Fort Worth plant of Consolidated Aircraft. B-24 Liberator bombers are in the foreground. Behind them, C-87 transports may be seen.





HARDENED AND DRAWN BY TOCCO IN 90 SECONDS

TYPICAL of TOCCO's speed-up of war production is its heat-treatment of 21-inch tank bogey wheels. Here is the split-second time for hardening and drawing a rim—all in one operation—from the moment of pressing the "start" button:

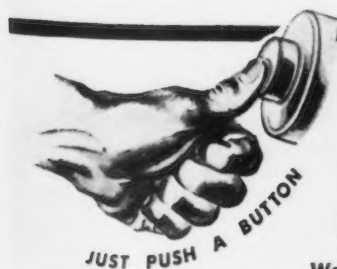
Time to heat to 1600° F.	17.5 sec.
Time to quench	14.0 "
Time to draw	13.5 "
Total time per rim	45.0 sec.

Total TOCCO-treating time for both rims

is only 90 seconds! This speedy, uniform hardening and drawing, localized at the wearing surfaces, has eliminated rejects due to cracking and has materially increased production output. Hardness of rims as drawn (S. A. E. 1335 steel) is 285-381 Brinell.

Find out how TOCCO electrical induction can speed-up and improve *your* war production. The same standard TOCCO machine, with a simple change of work fixture, can be adapted to the *low-cost* hardening, annealing, brazing or heating of peacetime products.

THE OHIO CRANKSHAFT COMPANY
Cleveland, Ohio



TOCCO

World's Fastest, Most Accurate Heat-Treating Process •

**HARDENING
ANNEALING
BRAZING
HEATING for
forming and forging**

customer; or, whether the customer will be referred to the second warehouse for confirmation of the sale.

Mr. Tayler indicates that the plan has been developed entirely on a voluntary basis, but general cooperation is expected.

Successful operation of the plan will result in expediting combat and war production requirements, save canvassing and shopping by individual buyers, and, important from the warehouses' point of view, result in a more rapid turnover of all steel stocks. Consumers will benefit by not having to maintain large inventories to meet contingent needs, and can count on warehouse reserves being available.

nor the WPB Salvage Division. In the far West—particularly in the Pacific Northwest—where freight costs chew a big hole in basing point prices which sellers may collect, their ardor in scurrying about to make collections is considerably dampened by the \$1.00 reduction. On the other hand, with an additional dollar margin, preparation, segregation and processing of scrap at point of origin, especially in auto wrecking yards, will be encouraged. Apparently the price change constitutes use of the "bait" theory by at least one section of the OPA, although other economists within the organization, notably those studying non-ferrous metal prices, have consistently rejected it.



ARMY GETS NEW DEADLY DIVE-BOMBER: The new Curtiss A-25 dive-bomber which a Missouri plant of Curtiss-Wright Corp. has delivered to the Army Air Forces has greater speed range and striking power than any dive-bomber now in action. The A-25 is an Army version of the famed Curtiss (SB2-C-1) Helldiver recognized by U. S. Naval and British aviation experts as "the world's best dive-bomber."

With stringent limitations on steel construction, structural steel fabrication and erection, as such, have gone the way of big beefsteaks and spare tires. No one is idle, however. Most of the fabricators have ship-building sub-contracts or are making marine parts. Some of the larger firms, such as Pacific Bridge Co., have undertaken direct construction of sea-going vessels or facilities. A good-sized covey are participating in the auxiliary or barge program.

THE increased spread for processors of steel scrap, by reason of the recent reduction of \$1.00 per ton in the ceiling price which scrap collectors and buyers may pay for unprepared material has not won a warm welcome from small collectors

No objection to this invitation for new outlying scrap processors to enter the business has been raised by the few large processors now dominating the field, since, as brokers, they will continue to collect fees of 50c. per ton from mills and prepared scrap buyers.

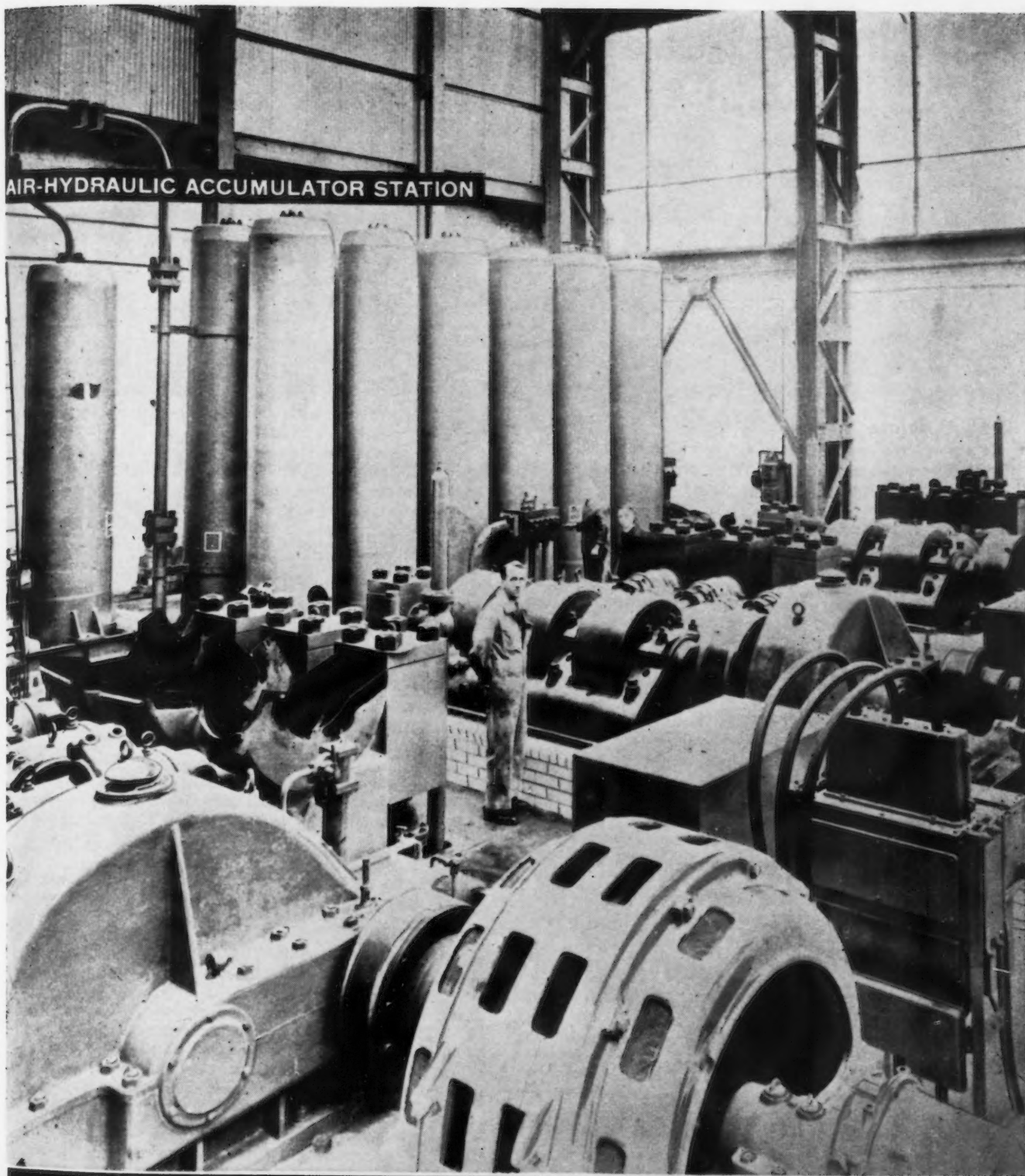
AS this is written, announcement of the War Labor Board decision on wage stabilization for the nine major Coast airframe manufacturers is expected momentarily. Both labor and management took exception to some of the recommendations of Paul Porter, chairman of the WLB panel which originally conducted hearings on wage and working condition proposals in the industry, when the case was reviewed before the full Board in Washington last month. Be-

sides its importance to the Coast, because of the dominant position of the aircraft industry in the local economy, the case has particular significance at this time because it offers an opportunity for the board to alter its "Little Steel" 15 per cent increase wage formula. Indication that the Board as a whole still stands by the 15 per cent increase, based on the rise of living costs between Jan. 1, 1941, and May 1, 1942, as adequate, was given last week in San Francisco where Wayne L. Morse, public member of the board, in the presence of Roger D. Lapham, industry member, and Delmond Garst, CIO representative, said the formula still stood.

"Sure, the cost of living has risen since the 'Little Steel' formula granted a 15 per cent increase to cover the rise in living costs between Jan. 1, 1941, and May 1, 1942, probably by 7 per cent," Morse said. "But American labor in the higher brackets has no right to expect to keep pace with the day by day changes in the cost of living. Labor in the high pay brackets should expect to make wage sacrifices in wartime—for the benefit of labor itself."

FORMAL announcement that directors of Consolidated Aircraft Corp. and Vultee Aircraft Inc. had recommended consolidation of the firms last week received headlines on the financial pages, but hardly could be classified as news. From the time the Aviation Corp. controlling Vultee, acquired 34 per cent of the outstanding stock of Consolidated from Major Reuben Fleet, founder of the firm, in Dec., 1941, it was conceded to be merely a matter of time and detail until the operation would be unified. Activities of both companies have been closely related since the stock transaction by means of interlocking directorates and operating officials. At the time of the stock transfer, Consolidated had a backlog of \$755,000,000, larger than any other California manufacturer, while Vultee's backlog amounted only to \$155,000,000. Vultee's profit position at that time was not bright, but since has steadily improved.

Mass production of the 33-ton, four-motored Coronado Navy patrol bombers will get underway soon by Consolidated. Although the big plane, which is capable of operating over a vast range and staying away from home base for months at a time, was developed some time ago by Consolidated, its production has never been heavy.



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Fatigue Cracks

BY A. H. DIX

Even the Priest Didn't Know

What is the literal translation of the Latin quotation on page 57 of the Annual Number, 'Publicist Nitens in Excelsos,' heading the X-ray of Henry John Kaiser?

Have had a number of calls on it. The head of one company said he took it up with a friend of his, a Catholic priest, but the translation didn't hook up with the story.

—Bill Phair, Chicago Editor

"Publicist Nitens in Excelsos" is not a stock model quotation, but is a made-to-order job, designed and executed in the brains department. It means "Publicist ever struggling upward," and is good Latin. Before being put to use it was given a run on Columbia U.'s dead language test block and came through with a white ticket.

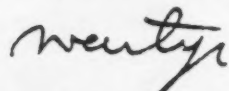
Shirt Ablaze

• • • We for one are sorry the question came up. For "Publicist Nitens in Excelsos" is much more impressive than its translation. A certain amount of deliberate obscurantism adds to any story or dish. The phrase "Vienna roast" causes the gastric juices literally to gush, while its bald counterpart "hash" makes them cower in their little hide-outs.

People about whom you know all are rarely interesting. When the perfect state emerges the last ten pages will be lopped off every mystery story, for explanations are always deflating and unsatisfying. Unsolved minor problems are what keep people from dying of ennui. When life pales for us we always turn to a note we got from John Howe Hall. It reads:

Remember the printer's bull that Kipling used to head one of his tails, "See the pale . . . with his shirt on fire."

We can't make out the fourth word of "See the pale . . .," for, as you will see from the reproduction, Mr. Hall was never one to get a button for excellence in penmanship. Sometimes we think it spells "martyr," but are not sure, as that does not make sense. However, this is no plea for help from J. H. or any other member of this page's loyal army of 18 readers. We enjoy wondering.



Stoppers

• • • The 29,161st . . . A Quitter?—Russell, Burdshall & Ward Bolt and Nut Co.

H. F. Cotter, of the University of Alabama, thinks the cream of the current headline crop is Kelvinator's "Blades of Wrath" (propellers). The function of a headline is not merely to stop the reader but to lead him into the text. Kelvinator's head is ingenious but not especially strong in follow-through.

Small Fry Elevator

• • • The temptation to continue quoting from the bundle of love letters the Annual Number brought us is great but we will resist it, not because we are modest but because of a fear of your yawning in our face.

We will, however, quote one. It is not exactly a love letter, but has to do with a novel use for the big book:

I'm going to take your oversize edition home with me for use when small fry have dinner with us. Just the thing to raise their chins above the rim of their plates.

R. C. Wais,
General Machinery Corp.,
Chicago, Ill.

When the New York City Bureau of Stores, Municipal Bldg., Room 2210, has finished with its copy of the Annual will it please pass along to Mayor LaGuardia?

Tricks with Figures

Whatever became of that good old unit of measurement, the ton? Municipal scrap collections are reported in pounds. I have seen airplane bombs increase from 100 lb. to 8,000 lb., but they haven't made a one-ton bomb yet. I am looking forward to seeing a Flying Fortress travel 20,000,000 ft. at an altitude of 120,000 in. and drop a 32,000-oz. bomb on Tokio.

—Deac

The theory, of course, is that the bigger the figure the greater the impression. But this is erroneous. To refer to the yacht of our Chicago editor, Bill Phair, as a 216-incher instead of an 18-footer diminishes instead of increasing the mental picture of its magnitude.

A member of the brains department just told us about an anti-aircraft gun that will shoot 50,000 ft. high. This didn't seem impressive until we translated it into "nearly 10 miles straight up." We feel far warmer with five tons of coal in the bin than with 25,000 lb., and a 4-ton bomb seems far more destructive than an 8,000-pounder.

So we agree with Deac that those who seek to increase the impression by enlarging the figure and reducing the unit of measurement accomplish the exact opposite. We know that about 25 millimeters make an inch, but a millimeter always seems to us an infinitesimal thing like an electron and we are sure it would hurt less to be hit by a 150-mm. shell than a 6-incher.

Misaptronyms

• • • Rose Cologne, who is Penn State's specialist in community adult education is wasting her perfume on the mountain air. She ought to be with Coty.

A letter came in the other day from Worden-Allen Co., Milwaukee, signed by "A. Sell, Purchasing Agent." When we received it from the brains department someone had pencilled on it, "Should be I. Buy."

Oxford Oversight

You use the word "insigne." It may be in your Webster, but I can't find it in the Oxford, which is considered standard in these parts. Can you quote some authority for its use?

C. M. Birkett,
The Steel Co. of Canada, Ltd.,
Hamilton, Ont.

All our dictionaries here in the States carry it. *Insigne* is simply the singular of *insignia*. You say to a soldier, "What is that insignie on your cap?" "Or what are those insignia on your uniform?" But like *datum*, the singular of *data*, the *insigne* is becoming a lost word, and *insignia* is being made to do both single and double duty.

Puzzles

Last week's \$1,000 was divided into ten envelopes, containing \$1, \$2, \$4, \$8, \$16, \$32, \$64, \$128, \$256, and \$489.

"You say that if it takes 7 days for a motor truck to traverse the Alcan highway, and every day a truck leaves from each end, a northbound truck would meet 14 southbound trucks. The way I figure it you lost one in the snow. Suppose you start north on the 8th of the month. A convoy that started south 7 days before will be just pulling in. And when you arrive at your destination 7 days later, the 15th, you will see one just pulling out. I make it 15." So writes James T. Gordon. Will S. H. (Dominion Tack & Nail Co., Ltd.) Marshall, who sent it in, fight it out?

This problem in statistics is from W. C. Marshall: Nazi reports of enemy casualties are invariably exaggerated. During a five-day period the following took place:

Actual Casualties	Reported by Nazis
117	2,263
25,123	58,527
2,150	6,838
1,820	6,095
342	2,770

On the sixth day there were 4000 actual casualties. How many did the Nazis report?

BIG-HUSKY-ACCURATE *is not enough!*

You've got to consider the "X" factor, too!

Sure, we make scales big, husky, and accurate. You've got a right to expect *that* from *any* good scale. But we at Fairbanks-Morse build something else into our weighing machines. We consider in the *design* of our scales—the "X" factor!

The "X" factor is composed of those things which cause inaccurate weighing, *not by the scale*, but by the men who use scales. In other words, the "X" factor in weighing is the *human* liability of inaccuracy.

Having designed and manufactured weighing equipment longer than anybody else in the world, it is only natural that we should know more about the causes of inaccuracy due to the "X" factor.

Consequently, you will find in our scales many little features, such as a pointer which rides *close* to the dial to avoid parallax, and numerals that have been selected for greatest readability. And if you want to completely eliminate the "X"

factor, we'll provide a ticket printer which prints an indelible record, automatically.

If you have a weighing problem, or want to speed up your weighing operations, come where there is more experience. Ask Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago.



Fairbanks-Morse Scale Engineers, because they are industrial specialists, can be of greatest service in fitting weighing machinery into your production flow. For weighing while in motion, secrecy in weighing, or automatic operation, ask for their counsel.

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WATER SYSTEMS
FARM EQUIPMENT
STOKERS
AIR CONDITIONERS
RAILROAD EQUIPMENT



Scales

Dear Editor:

STOVE CONSTRUCTION O.K.

Sir:

In your Jan. 7 issue, T. W. Lippert mentions several defects in the blast furnace stoves of the Kaiser Co. at Fontana, Cal. We resent very seriously the way this article is written. In the first place all we erected was the complete brick lining and checker system in these three stove shells. The design of the stove shells was obtained by the Kaiser Co. from another steel company. We understand these shells were designed by one of their engineers. They were constructed, however, by the Consolidated Steel Co. with a number of changes made due to the excessive changes of temperature in this territory and to the California earthquake laws.

It is absolutely untrue that no provision was made by these companies for distributing the stresses and our report shows that when the stoves were completely heated up the shells were on their foundations in a normal position. As far as our work is concerned we attach herewith copy of letter received from the chief inspector of the Kaiser Co. in which they state that the linings were installed exactly in accordance with the specifications and were satisfactory in every respect; in fact, their general superintendent stated frankly to our engineer in charge that all of our work on this particular job was completed in a very satisfactory manner and that no company on the job had been more helpful nor completed their work more efficiently than the Bailey Co.

Your article indicated exactly the opposite condition and we believe, in all fairness, you should publish a correction of this false statement.

We did not agree with some of the methods used by the Kaiser Co. and told their representative so frankly, but our only responsibility was to fulfill our contract honestly and correctly.

We have already had this article called to our attention a number of times and feel that the article may do us a serious injury in the engineering and blast furnace field. I scanned over the entire article and it would appear to me that the author used a dagger instead of a pen in writing the article.

WILLIAM M. BAILEY,
President

William M. Bailey Co.,
Pittsburgh, Pa.

• Item criticized stated only that stoves were of Bailey type not that the Bailey Co. was responsible for constructional faults. Furthermore, item states that stove plate work was altered to provide distribution of stresses.—Ed.

Sir:

Congratulations on your lead article in the Annual Number. It was just about the most masterly thing I have ever seen on the printed page, and certainly it is unsurpassed, if ever equaled, in the field of industrial journalism.

The difficulties of reporting on the extremely complex and controversial year were colossal, yet you accomplished the task with clarity, humor and distinguished style.

JOHN C. LONG,
Mgr. of Publications
Bethlehem Steel Co., Inc.,
Bethlehem, Pa.

Sir:

I am indeed grateful that I have had the opportunity to read your masterful article "1942" in the January 7 issue.

The various diagrams and tables are most illuminating and instructive.

Where we are going, what the final picture will be, none of us knows, and perhaps due to this fact it is inevitable that all of us will be the victims of considerable mental turmoil.

To rationalize is painful. Let us derive what comfort is possible from the thought that man has never known where he is going and in what shape he will arrive.

In closing, I thank you sincerely for the most unbiased and scholarly resume it has been my fortune to read.

WM. P. MacDONALD
Shepard Niles Crane & Hoist Corp.,
Montour Falls, N. Y.

Sir:

I want to congratulate you on your masterly review of 1942 in your January 7 issue. The scope, accuracy and insight reflected in this article are indeed impressive.

HENRY D. SCOTT,
Vice President
Wheeling Steel Corp.,
Wheeling, W. Va.

Sir:

I have just finished reading your article "1942" in the Annual Number, and I hasten to congratulate you on its brilliance. It is seldom that I have read an article so absorbing, so encyclopedic in scope and so penetrating in its analysis of the subject matter under review.

G. L. LACHER
United States Steel Corp. of Delaware,
Pittsburgh, Pa.

Sir:

Your article "1942" struck me as one of your best and most interesting. The last part from page 64 on was particularly arresting. I read this section to Mrs. Walton, who is unusually socially conscious due to her activities as a social worker and Red Cross worker. The meat of the last two

paragraphs I would like to see amplified and written for publication in some magazine such as *Collier's* or even the *Saturday Evening Post*. It should reach a large audience.

S. F. WALTON,
Technical Director
The Exolon Co.,
Blasdel, N. Y.

APOLOGY

Sir:

We notice in your article "E is for Excellence," appearing in the January 7 issue, that you used the kodachrome which we forwarded on November 5, 1942, showing the American flag and Army-Navy E burgee.

We think it is a fine article and picture display. However, we are unable to find the credit line for the photographer.

E. A. LAWRENCE
Wright Aeronautical Corp.,
Cincinnati, Ohio

• Our apologies for the oversight. The photograph was taken by David Tandow, Wright Aeronautical Corp., Cincinnati, Staff Photographer, and was supplied by the courtesy of E. A. Lawrence of the same company.—Ed.

SPONGE IRON

Sir:

Please advise me if you have published articles recently in your journal on sponge iron.

H. G. SCHURECHT,
Professor of Research
New York State College of Ceramics,
Alfred University,
Alfred, N. Y.

• See page 55 of Jan. 7, 1943 issue. Also July 23, 1942 issue, page 81.—Ed.

SCREW MACHINE INSTRUCTION

Sir:

Do you have any literature on Apprentice Training for screw machine operators or on the working of steel parts on automatic screw machines and turret lathes?

H. J. HENKE
Harper-Wyman Co.,
8562 Vincennes Ave.,
Chicago, Ill.

• There is very little printed information available on screw machine operations that would be suitable for apprentice training courses. Perhaps the best material can be found in the operator manuals that are issued by the screw machine builders. National-Acme Co., Cleveland, has a very good booklet.

A general review of automatic screw machines can be found in "Boring and Turning Practice" by Colvin, published by McGraw-Hill Book Co., 330 W. 42nd St., New York, price \$4. "Metal Processing" by Professor O. W. Boston, also has a chapter or two on automatic screw machines. The publisher is John Wiley & Sons, 440 Fourth Ave., New York. The best book on turret lathe operations is "Turret Lathe Operator's Manual," published by Warner & Swasey Co., Cleveland.—Ed.



A Tough Spot for a Spring, too!

UNCLE SAM'S anti-aircraft guns make the skies a tough spot for enemy planes, but these fast-firing guns are also tough on their own component parts.

The recoil springs, for example, must absorb the terrific kick of powerful shells many times per minute—function flawlessly, despite the intense heat generated by such rapid and continuous action—and combat that arch enemy, corrosion, at all times. But Muehlhausen Springs are doing this remarkable job—for they are designed, fabricated and tested to meet the most rigid requirements; have that extra strength and stamina to take a real beating under all conditions.

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- New Die Spring Bulletin illustrates, describes 206 sizes and types of die springs.
- New Armament Bulletin shows importance of springs for many types of war equipment.



This Industrial Week . .

- **Truman Committee Throws Darts**
- **Orders for Components Hastened**
- **100,000 Tons Excess Steel Seen**
- **CMP Setup Changes Like PRP Did**
- **Steel Ingot Rate Unchanged**

THE past week was no exception to the "never a dull moment" rule of war, in contrast to the traditional midwinter lull of peacetime when many executives basked at warm resorts. Developments have been coming fast on all parts of the industrial front.

The Truman Senate Committee report on steel took jabs at the steel industry, at the Army and Navy and other authorities, mingled with some praise and a little political needling. An amendment which some persons considered to be significant was announced in the Controlled Materials Plan. At the same time a directive from WPB hastened the placing of orders for components for war equipment required during 1943, creating a flurry of activity over the nation.

Meanwhile, at least one new unbalanced situation threatened to grow larger to plague the steel industry, which is producing ingots this week at the high rate of 99.5 per cent, unchanged from last week. Difficulties at marginal beehive coke ovens appeared to be increasing. This situation would not force out of production some of the larger steel companies' blast furnaces, but if it grew it could reduce overall output of iron and at the same time force the banking of some merchant furnaces which depend entirely upon Connellsville supplies.

Ingot top cuts are beginning to pile up at some steel company plants and at the same time WPB is expanding as far as possible the use of bessemer steel. The growing accumulation of ingot top cuts (aside from the usual ingot discards taken on all steel to eliminate piping) is due to several factors, including a recent restriction on new billet reinforcing bar manufacture. Lack of hot top-ping facilities has made deeper cuts in the ingot necessary. Also, there are many special cases where only a small portion of the ingot can be used.

AT Washington, officials estimate there is enough excess steel in bessemer, top cut billets and used rail to enable WPB to release 100,000 tons of steel a month for essential civilian needs. Typical products which could be made from this excess include reinforcing bars, angles, ties, fencing and wire. The question is raised as to why this overage of bessemer and top cut billets could not be used for such essential programs as ships or the railroads. The answer given is that the limiting factor in these programs is plate capacity, which is fully engaged. Another reason advanced is that steel products taken from these sources would be of varying quality, not adapted to specialized military purposes, but satisfactory for the civilian products mentioned.

From the standpoint of the steel industry as a whole, new orders in January were not far below the volume of December. In some areas, district sales offices had a poor month on bookings, but this meant little because of the heavy directives which came directly to steel company headquarters from Washington. Much steel has been released for the expanded program for escort vessels.

One of the tightest situations in the steel industry today is that concerning tube rounds for high pressure boiler tubing for ships. Makers of seamless and welded tubing for aircraft uses, in heavy demand for many months, continue to be hard pressed.

NON-INTEGRATED tube makers claim that if allocations of semi-finished steel were increased, production of finished tubing could also be increased. However, some large integrated mills claim that if they did not have to ship so much semi-finished material, they likewise could step up tubular production. The whole question, however, seems to be one of which comes first, with the necessity of making important decisions between aircraft tubing, large forging rounds, plates, and other strategic demands. Only so much steel can pass through blooming or slabbing mills and heavy demand for certain products means a cutting back for others.

Reports have been current that in some cases hot rolled sheets are available in a relatively short time, while other reports seem to belie this condition. Both reports are correct. Large steel companies with continuous mills which are working almost entirely on plates find it almost impossible to produce hot rolled sheets in any quan-

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ties. On the other hand, continuous sheet mills which are not set up to roll plates can obviously give better deliveries to proper priority orders than can the sheet mills which are rolling plates. Even at those mills where sheets can be obtained this situation may become tighter as demand for barrel stock and other war uses skyrocket over coming months.

All told, considering the mammoth job facing the steel industry and the WPB, cooperation between the two apparently has reached a new high mark. Each has a sounder appreciation of the other's job. With steel quotas being tuned monthly to realistic requirements, any drop in steel production not anticipated now would tend to create a very tight situation. All quotas are set up with only a small amount of leeway.

THE CMP amendment announced this week, whereby allotments of controlled materials will be made upon a quarterly instead of a monthly basis, had been expected by some priorities authorities who saw PRP changed similarly. Reduction of paper work is the goal of the change, and it is hoped also that closer coordination will result.

New light came last week on one of industry's most bothersome problems—absenteeism. Recognizing the seriousness of absences from war production plants, the War Manpower Commission completed a survey which showed daily absences in war plants averaging 4.5 per cent of total employees. The Commission discovered that the community and management are partly responsible as well as the workers themselves. The great amount of time necessary to visit ration boards to keep family affairs in proper shape, the early closing hours of some institutions, and related reasons are among the factors accounting for absenteeism. In some industrial centers, absences slowly are declining, however.

A plan for centralized information on inventories of steel warehouses is shaping up in California and if it works satisfactorily it may be adopted elsewhere in the nation. Available stocks of all warehouses and industrial users will be listed, together with government holdings of steel. Certain operating details remain to be worked out. For in tance, it is not indicated whether a given ware-

Allies Get Axis Iron and Steel

• • • Nearly 32,000 tons of iron and steel (including tinplate) were among the basic war materials stranded in warehouses or at terminal points throughout the United States which have been requisitioned by the Board of Economic Warfare. Most of the materials and articles, valued at more than \$34,000,000, were purchased originally by interests in Axis or Axis-dominated countries. They were located and diverted to United Nations war use.

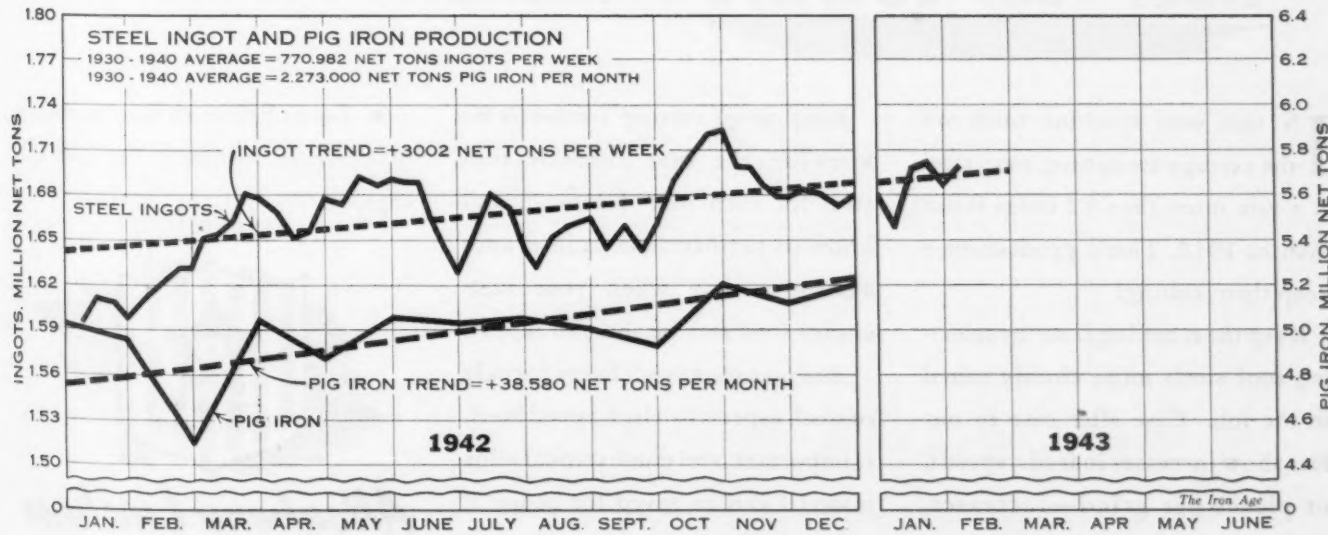
Carloads of these goods, which had been manufactured for export, had been immobilized by Government "freeze" orders and denial of application for export. Iron and steel products requisitioned by or purchased through the Board up to January, were valued at \$5,221,010. 12,000,000 lb. of raw rubber had an estimated value of \$2,092,731; automotive and units and equipment, \$21,418,294; and chemicals, \$892,676.

Iron and steel products included such materials as steel sheets, steel plates, reinforcing bars, barrel heads and bottoms, galvanized sheets, gas tubes, baling strips, rails, wire.

house, unable to fill a requirement, will purchase from another warehouse indicated by the clearing house, or whether the customer will be referred directly to the second warehouse.

Over the nation, steel warehouses generally are in better shape on their inventories than at any time in months.

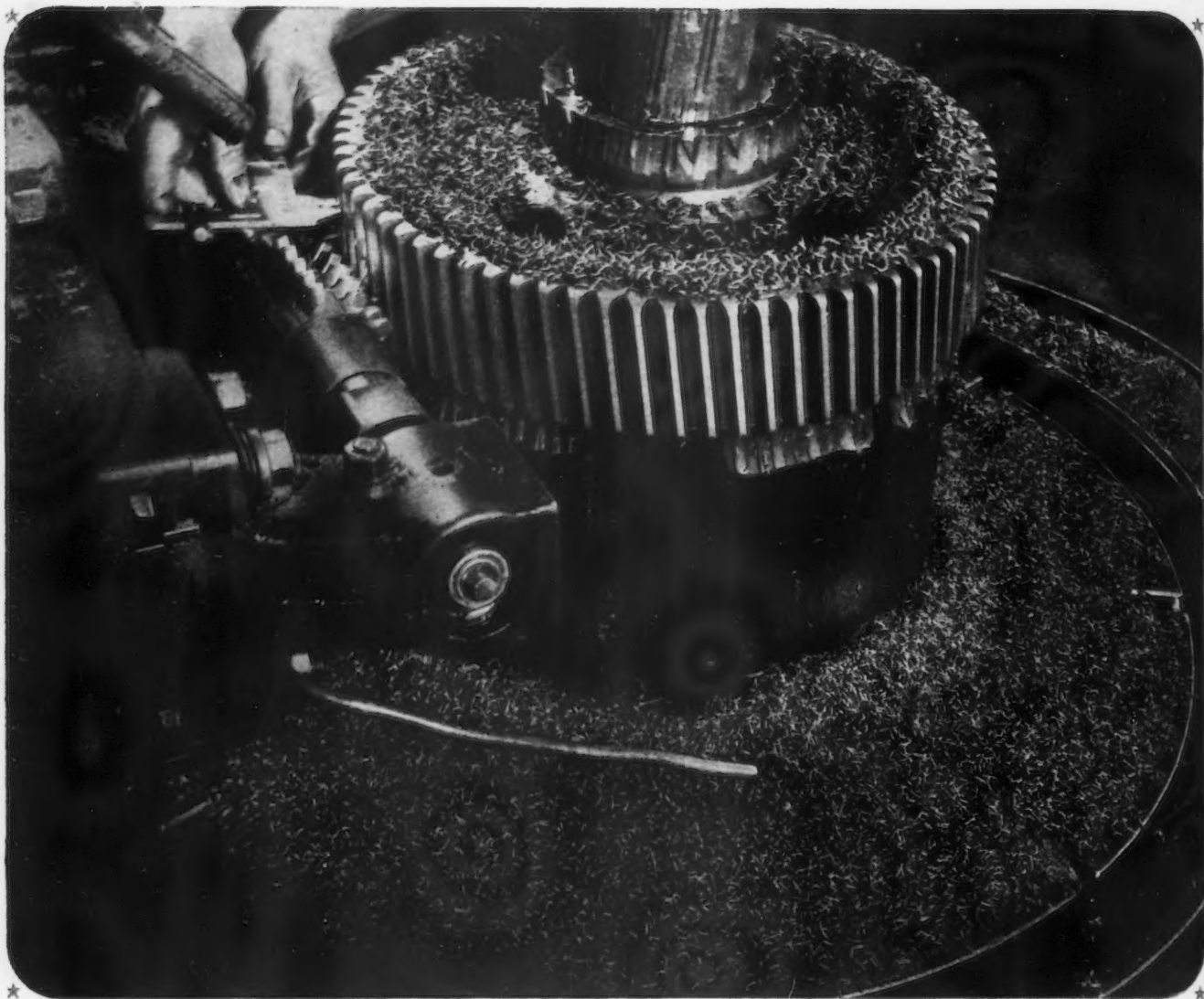
STEELMAKING at Pittsburgh this week lifted one point to 100.5 and at Detroit to 104.5 per cent. Philadelphia gained half a point to 92.5 per cent while at St. Louis schedules were up a point and a half to 106.5 per cent. The melting rate at Buffalo dropped two points to 104.5 per cent. Output in Cincinnati was down five points to 100 per cent while in the Eastern District steel ingot production fell off three points to 100 per cent of capacity. Unchanged for the week are operations at Youngstown at 101 per cent; Cleveland at 95.5 per cent, a revised rate, and Wheeling at 90 per cent.



Steel Ingot Production by Districts Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	S.Ohio River	West	St. Louis	East	Aggr e
January 28	99.5	100.5	101.0	92.0	95.5*	106.5	90.0	102.0	103.5	105.0	102.0	105.0	103.0	99.5
February 4	100.5	100.0	101.0	92.5	95.5	104.5	90.0	102.0	104.5	100.0	102.0	106.5	100.0	99.5

* Revised



KEEP 'EM CUTTING . . AND SAVE THE PIECES

IN this war, machine tools on the average are cutting away steel at a rate more than 12 times faster than in 1918. That's production—keep them cutting!

Keep them cutting *faster* by selecting tool steels more closely suited to the job. Case after case in our files show increases in feeds, speeds, or pieces per grind—increases, often, of 50% and more—when the *right* tool steel went to work.

Keep them cutting *constantly* by knowing the best alternate tool steel for each job. Know it, and know its performance, as insurance against a time when your first-choice steel may be short in supply.

And save the pieces! Every particle of steel, especially High Speed Steel, is important, and much critical alloy material can be saved for re-use if proper methods of reclamation and classification are employed.

• Let us help with your problems of selection, treatment, use and salvage.

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A-8592 . . W & D

Extra Heavy Cuts from Ingots Create Problem for WPB of Finding Outlets

Pittsburgh

••• The War Production Board currently is attempting to find outlets for ingot top cuts which are beginning to pile up in some steel company plants, THE IRON AGE has learned.

It is also said that WPB is expanding as far as possible the use of Bessemer steel over and above the applications which generally have been acceptable. Recently, it is said, a WPB official at Washington indicated that several hundred new Army and Navy applications for Bessemer steel soon would be available.

The growing accumulation of ingot top cuts (aside from the usual ingot discards taken on all steel to eliminate piping) is due to several factors, including a recent restriction placed on new billet mills as far as making concrete bars is concerned. Other factors which have contributed to the growth of ingot top cuts are: the necessity for deeper cuts owing to lack of sufficient hot topping facilities, the overall tightening of chemical and physical requirements for war steel, and numerable special cases where only a portion of the ingot can be applied on a specific order.

Aside from these war-time factors, which have caused the growth of ingot cuts, are the normal inventories of off heats, off grade, and off surface steel, much of which usually went into concrete bars or so called light rails. The reinforcing bar restriction order on new billet mills will accentuate this situation to some extent, but many companies hope to be able to find their own outlets for this type of steel, or at least obtain relief from WPB.

It is believed that WPB already has made comprehensive plans which are expected to require large tonnages of Bessemer steel, ingot top cuts, off heats, etc. While the nature of these plans has not been disclosed, informed sources are optimistic that at least some of the effects of the reinforcing bar restriction order will be eradicated in the near future. Meanwhile, many steel companies are endeavoring to find additional applications which are suitable for their accumulations.

Whether the diversion of the greater portion of the concrete bar business to the rail steel rerolling

mills eventually will force the scrapping of ingot top cuts and other similar supplies which could be used for other purposes, remains to be seen. The swing in concrete bar production from the new billet mills to the rail steel mills resulted because the WPB thought it necessary to keep the personnel and the plants of the rail steel rerolling mills "alive"

While some WPB officials informally have attempted to get billet mills

to scrap their ingot discard accumulations, it is not believed this represents the official opinion of the WPB Iron and Steel Branch.

Meanwhile, there is no question on the regular practice of cropping ingots to avoid piping, as these discards always have been used for scrap purposes. It is the metal over and above regular cropping plus off heats, etc., which has given rise to the current problem.

Excess Equals 100,000 Tons Per Month

Washington

••• "There may be a shortage of vegetables and not a tight market in peas." Thus spoke a high WPB official last Friday in saying that there should be a limitation of limitation orders with respect to steel.

Officials estimate that there is enough excess steel in Bessemer, top-cut billets and old used rail to enable WPB to release 100,000 tons of steel monthly for essential civilian needs. Typical products to be made from this excess would be wire, fencing, angles, ties, reinforcing bars, etc. To support this view, an example is billets destined for shell steel use. Top-cut billets or billets which would not be suitable for shell making are withdrawn from the billet mill. There is no use to which these billets can be put today so they are being piled because WPB will not permit their use for other purposes.

The WPB Conservation Division has been particularly active in denying re-

quests of this kind, saying that the top cuts could be used for scrap. But scrap supply is generally conceded to be easy.

Concrete columns substituted frequently contain as much by weight as 60 per cent of the steel they take the place of.

The question is raised as to why this overage of Bessemer and top-cut billets could not be used for such essential programs as ships or the railroads. The answer given is that the limiting factor in these programs is plate capacity, which is now fully engaged. Another reason advanced is that steel products taken from these sources would be of varying analyses, not adapted to specialized military purposes, but satisfactory for the civilian products mentioned.

It is said that there is 1,000,000 tons of Bessemer steel capacity idle. Some Bessemer now made is devoted to civilian use and is being given to manufacturers of farm equipment.

Concentration of Bar Output Extended

Washington

••• The program for concentration of reinforcing bar production in steel rail rerolling mills has been extended to three Pacific coast states and two steel mills whose output has always been largely in reinforcing bars are being permitted to continue in production of the bars. One of the latter is the plant of the Judson Steel Corp. at Oakland, Cal., and the other is the plant of the Sheffield Steel Corp. at Sand Springs, Okla.

Three-Way Solution Offered By WMC To Reduce Absenteeism

• • • Recognizing the seriousness of absenteeism and seeking a possible solution, the War Manpower Commission undertook recently to survey representative plants. This study, just completed, helps show the extent of absences and indicates why workers lay off from their jobs.

Daily absenteeism in war plants is estimated conservatively to average 4.5 per cent of total employees but ranges from 1.5 to 10 per cent. Of the reasons given for absences, illness by far outranks all others although a check by a nursing service in one instance showed that no more than 30 per cent of those claiming illness actually were absent for that reason. Other popular reasons include the necessity of cashing pay checks, shopping for other jobs, making essential trips to rationing bureaus and numerous personal reasons. Absenteeism is found to be confined and concentrated mainly in a group representing about 15 per cent of the total of employees.

Analyzing the problem, WMC has come to the conclusion that it requires a three-way solution and triple sharing of the responsibility.

Jointly responsible in varying degrees for absenteeism are the community, management and labor, say WMC officials. Since each is partly at fault, corrective measures for each are being suggested by WMC.

The Community

Many of the reasons given for absenteeism relate to the conventions of society. Banks closing at 3 p. m. have caused some difficulty in the cashing of checks and the carrying on of normal banking relations by turn workers. Stores, theaters and places of amusement whose hours do not meet with those of the turn worker have interfered. The necessity for visiting rationing boards in the daytime has been another reason. There are numerous other factors.

To correct these causes of absenteeism banks, libraries, theaters, stores and other community enterprises are urged to reschedule their business hours, at least two or three days a week. In some instances, rationing boards have been convinced to install branch offices right in the plants to facilitate the handling of worker's rationing problems on the spot. Newspaper articles and radio sketches aimed at educating the worker to the

seriousness of the production and absenteeism problem have been suggested as has a general radio and newspaper airing of the entire subject for the same purpose.

Management's Part

Management has been at fault in some instances mainly in not recognizing the problem early enough because it was an unexpected one which had never occurred before. For the most part the WMC findings indicate that absenteeism is at its lowest where morale is highest. Thus, management's biggest problem is to keep morale up and educate the worker to the seriousness of the problem. Wherever labor-management committees are established, management has one of its most potent tools for achieving these ends.

Through these committees, pep-up and morale moves can be carried out through posters, movies, meetings and other means. An outstanding example

NO ABSENTEE: On the job for 758 consecutive days — Saturdays, Sundays and holidays included — is the record chalked up by Lloyd Van Ness, who works at Caldwell, N. J., for Curtiss-Wright Corp. John Van Ness, 17-year-old son of the holder of this unusual record, was one of the first to invade Tulagi as a Marine Raider, and one of three who survived.



of just such a move is a new plan about to be put into effect by an aircraft plant at Buffalo which is at once a work incentive plan and one which will discourage absenteeism. The Army and Navy have excellent work incentive and morale building programs which can be applied to any plant producing for them with good results. Frequently it has been found that workers take a new interest in work when they are shown the war role being played by the part or material they personally make. The Army and Navy programs which bring heroes back to tell workers what their labor means to the armed forces have accomplished just this. Overlong hours, too, have been found a cause for absenteeism and should be avoided according to the WMC study. Concerted health programs operated by plants also have been effective and are recommended by WMC.

Labor's Responsibility

While the community and management are charged with a full share of responsibility by WMC, labor itself is held to be the key to the problem, at least after the former units have made their contributions to the purpose. Greater realization of the seriousness of the halts and slowing of production caused by absenteeism must be created in labor itself. One of the most practical means of accomplishing this is assigned to the labor unions which by means of education and possibly even enforcement measures should be able to influence workers to report regularly. The same type of organization which has enabled the unions to influence men to wield mass power to achieve wage and working condition gains, should in the opinion of WMC be able to create steady workers. Union disciplinary measures are not suggested by WMC, but the facts point in that direction unless some other step will turn the trick.

Plane Firm's Absentees Will Be Branded "AWOL"

Buffalo

• • • Bell Aircraft Corp. will brand "slackers" in its plants in the Army manner. Workers failing to obtain permission for time off will be marked absent without leave and cards with the glaring letters AWOL will be substituted for their usual time cards. An o.k. from a foreman will be required before the employee gets his time card back. The company said the new policy has the full approval of the labor-management committee.

Unbalance in Aggregate Supply Of Beehive Coke Appears Growing

Pittsburgh

••• Difficulties in production of beehive coke on the so called marginal ovens during the past several weeks have produced an unbalance in overall supplies which could result in the banking of some blast furnaces. Whether or not the situation clears up within the next few weeks remains to be seen.

At least five steel companies whose blast furnaces have been producing pig iron somewhat in excess of normal production and which consequently found by-product coke insufficient to meet the new high production records, have been forced to seek beehive coke supplies in the open market to take care of their fuel requirements. In the past week or so, a strike at one coke oven plant and a heavy snow fall upset the fine balance between supply and demand.

Ovens more seriously affected have been the hand-drawn plants where the difficulty in obtaining coal and the high absentee rate has affected production. A strike at one plant lasting about four days resulted in an irrevocable loss of approximately 2000 tons of beehive coke recently.

In addition to these factors, one plant in the Connellsville, Pa., region has had to shut down approximately 118 ovens out of 350, while another plant has had to close down 45 ovens out of 100 because of lack of coal. While this condition will undoubtedly be remedied in the coming weeks, the shutting down of each oven means the irretrievable loss of approximately 50 tons of coke per oven a month.

While the machine-drawn plants are not faring so badly, and while the plants at the H. C. Frick Coke Co. find themselves in good condition, hand-drawn oven operators are in a much different situation. The draft and higher paid war jobs has drained their younger force to such an extent that the personnel is composed chiefly of older and inexperienced workers. Absenteeism is exceptionally high recently among these workmen and it is said that from one to two days are lost at many coke oven plants after pay day. While the six-day week with time and one-half on the sixth day has reduced absenteeism at some of the more modern and machine-drawn plants, this is not true at the hand-drawn plants—a condition prob-

ably due to the differences in the ages of the workmen, as well as the length of service.

While the hand-drawn ovens do not constitute an exceptionally large percent of the total beehive coke output, they do nevertheless account for a percentage which, during times like these, can overnight change the balance in supplies from one of stabilization to one of tightness or shortage. Furthermore, trends are such that they are reacting against the hand-

drawn ovens. Mines are running out, coal must be hauled longer distances, and the man-power situation is becoming more serious. In addition to these adverse factors the steel companies which are clamoring for beehive coke supplies have the threat of a major coal, and hence coke, strike later on when the UMW attempts to obtain higher wages for its members.

The lack of beehive coke would not force out of production some of the larger steel companies' blast furnaces, but it could reduce overall output and at the same time force the banking of some merchant furnaces which depend entirely upon Connellsville supplies.

Steel Landing Fields Get Wide Combat Use

Washington

••• Portable steel runways for emergency airplane landing fields in theaters of operation are being produced in quantities by American manufacturers under the supervision of the Corps of Engineers, Services of Supply, the War Department has announced. During 1942, a sufficient number of these landing strips was delivered to the Army to lay a continuous 150-ft. steel runway from Washington to Buffalo. Deliveries are expected to be even greater in 1943.

Effectiveness of the portable landing equipment has been demonstrated in the North African campaign, the

operations in the Southwest Pacific and in other combat zones occupied by American troops.

The landing mats consist of prefabricated steel grids or networks, constructed in sections, which may be packed easily and transported by plane or ship. Wherever suitable terrain may be located, these sections are quickly stretched out and locked together, saving weeks of ordinary construction work. It is sometimes possible to provide a field 150 by 3000 ft. in less than 48 hr., not including grading or other preparations.

The portable steel mats were developed to permit continuous operation in advanced zones by heavy bombardment, reconnaissance, pursuit and transport planes. Several types have been accepted and standardized for use, differing principally in details of construction.

THREE G-E MEN RECEIVE AWARDS: Three General Electric men received awards at the national technical meeting of the American Institute of Electrical Engineers in January. Dr. G. Wesley Dunlap (left), received the Alfred Noble prize; Gerard Swope, president of the company, was awarded the Hoover Medal, and Dr. Willis R. Whitney (right), received the John Fritz Medal.



Nearly 50 Years of Service to the Steel Industry

In the early days of our steel expansion, before the United States Steel Corporation had been formed, the Charles Dreifus Company had its beginning.

The Charles Dreifus Company, as a broker in iron and steel scrap, still has as its customers some who were its customers nearly 50 years ago (or their successors). We are proud of this record.

Steel companies and scrap producers, as well as such Government agencies as the War Production Board, the Office of Price Administration and the Army and Navy, recognize the important role of the scrap broker in keeping the iron and steel industry operating at a rate that will bring a speedy and victorious conclusion of the war.

We solicit further opportunities to be of service in the movement of iron and steel scrap from industrial plants, railroads and scrap yards to steel plants and foundries.

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Unfilled Orders of Bethlehem at Peak

New York

••• Unfilled orders of Bethlehem Steel Corp. on Jan. 1 were \$2,394,500,000 against \$1,327,500,000 on Jan. 1, 1942, stated E. G. Grace, president, here on Jan. 28. Net billings for 1942 were \$1,513,291,932 against \$961,240,737 in 1941 and will approximate \$2 billion in 1943. The per cent of profit on billings was 1.68 in 1942.

About \$2,050,000,000 of the unfilled orders at the start of the year represented shipbuilding, said Mr. Grace. Bethlehem with 75 ways proposes to deliver 372 major ships in 1943, including 219 merchant vessels and numerous escort ships. Some of the latter will be ready soon. In 1942 the company delivered 162 ships, 284 landing barges and made 156 major ship conversions.

Bethlehem's net income for last quarter of 1942 was \$5,731,289. Net for the year 1942 was \$25,387,760 against \$34,457,796 for the full year 1941. The company has 262,000 employees at present.

Mr. Grace said Bethlehem, in sym-

pathy with the principal of renegotiation, currently is revising conditions in its contracts to meet the company's policy of only looking for reasonable profits.

He expressed the belief that the steel industry will encounter no further serious problems in regard to metallics, pointing out that the scrap return from manufacture of war products had been underestimated. Steel will be available this year for necessary civilian items, he said.

The estimated cost of completing Bethlehem's construction authorized and in progress Dec. 31, 1942, was \$39,500,000, including around \$25,000,000 for development of iron ore property in Venezuela. After the mines begin operating in 1944 about 2,000,000 tons per year of ore with natural iron content of 65 per cent will be obtained.

Work on the ore property began in 1941 but stopped for a while because of lack of equipment. Now, work has been resumed. The ore will be brought to Trinidad and transferred there to ocean going vessels.

U. S. Steel Corp. Payroll \$735 Million

New York

••• The payroll of United States Steel Corp. jumped from \$601,117,053 in 1941 to \$735,981,326 in 1942 while the yearly average number of employees rose from 304,248 to 335,866, said Irving S. Olds, chairman, at a press conference Jan. 26. Corporation earnings were reported in the last issue of this magazine.

Preliminary talks have been held in regard to renegotiation of government contracts, said Mr. Olds.

The Corporation added less than 500,000 tons of new capacity last year, he said. Some projects were delayed by low priorities. The remaining two-thirds of the Corporation's electrolytic tinplate capacity which is in three areas will be in operation during the current quarter, the chairman said.

U. S. Steel has some of its best minds working on post-war plans, Mr. Olds revealed.

Total capital outlays during the 12 months of 1942 for additions to and betterments of properties, plus mine stripping expense, was approximately \$120,200,000. On Dec. 31, 1942, unexpended balances on all authorizations for property additions and replace-

ments, plus mine stripping expense, amounted to approximately \$136,000,000. This figure does not include government owned facilities.

Keystone Quarterly Earnings

••• Keystone Steel & Wire Co., Peoria, Ill., reported for the three months ended Dec. 31, 1942, the second quarter of the company's fiscal year, net profit of \$265,354 after all charges. For the six months ended Dec. 31, net profit amounted to \$456,931.

Carpenter Steel Dividend

••• Net profit of \$367,538 for the December quarter has been announced by Carpenter Steel Co. This figure was determined after deduction of all charges, and after the setting up of an additional \$300,000 reserve for undeterminable taxes and other contingencies. This profit was equal to \$1.02 each on 360,000 shares of capital stock. It compares with the September quarter net of \$352,261, or 98c. a share, and \$522,136, or \$1.45 a share, reported for quarter ended Dec. 31, 1941.

Camouflage



Armor Welding

The unseen strength of our armed forces lies hidden in the welds of hard hitting offensive weapons. Chromang is the welder's choice for production on the home front as well as for quick repair in the field. Arcos has been making armor welding electrodes since 1937.

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401 NORTH BROAD ST., PHILADELPHIA, PA.

Distributors Warehouse Stocks in the Following Cities:

Borger, Texas.....Hart Industrial Supply Co.	Kingsport, Tenn.....Slip-Not Belting Corp.
Boston, Mass. (Beimont), H. Boker & Co., Inc., W. E. Fluke	Los Angeles, Calif.....Victor Equipment Co.
Buffalo, N.Y.....Root, Neal & Co.	Milwaukee, Wis.....Machinery & Welder Corp.
Chicago, Ill.....Machinery & Welder Corp.	Moline, Ill.....Machinery & Welder Corp.
Cincinnati, Ohio.....Williams & Co., Inc.	New York, N. Y.....H. Boker & Co., Inc.
Columbus, Ohio.....Williams & Co., Inc.	Oklahoma City, Okla.....Hart Industrial Supply Co.
Detroit, Michigan.....C. E. Phillips & Co., Inc.	Pampa, Texas.....Hart Industrial Supply Co.
Erie, Penna.....Boyd Welding Co.	Pittsburgh, Pa.....Williams & Co., Inc.
Fresno, Calif.....Victor Equipment Co.	Rochester, N. Y.....Welding Supply Co.
Fl. Wayne, Ind. Wayne Welding Sup. Co., Inc.	San Francisco, Calif.....Victor Equipment Co.
Honolulu, Hawaii Hawaiian Gas Products, Ltd.	Seattle, Wash.....Victor Equipment Co.
Houston, Texas..Champion Rivet Co. of Texas	St. Louis, Mo.....Machinery & Welder Corp.
Kansas City, Mo..Welders Supply & Repair Co.	Syracuse, N. Y.....Welding Supply Co.
	Wichita, Kansas.....Watkins, Inc.



"QUALITY WELD METAL
EASILY DEPOSITED"

Inland's Net Income Off \$4 Million in '42

••• The Inland Steel Co. and its subsidiaries reported last week a net income for 1942 of \$10,721,372 after \$2,000,000 reserve for post-war contingencies and \$23,866,000 provision for Federal income and excess profits taxes.

The preliminary earnings are equal to \$6.57 a share for the year and com-

pare with \$14,824,053, or \$9.08 a share, in 1941. For normal Federal taxes last year \$6,008,000 was provided, and for excess profits tax, after giving effect to debt retirement and post-war credits, \$17,858,000. In 1941 the company provided \$7,605,000 for normal Federal tax and \$15,650,000 for excess profits tax. The 1942 contingency reserve was provided out of final quarter earnings.

Net profit for the final quarter of 1942 was \$2,607,482.

Republic Earns \$2.67 Per Share During 1942

••• Republic Steel Corp. announced a consolidated net income of \$17,154,578 in 1942 after all deductions, including provision for Federal income and excess profits taxes, compared with \$24,038,340 in 1941. The earnings in 1942 were at the rate of \$2.67 a common share, compared with \$3.87 in 1941.

Provisions for Federal income and excess profits taxes in 1942 totaled \$67,865,000, compared with \$46,250,000 in 1941. Total sales were \$521,110,835, against \$483,812,368.

With increased steel capacity, the rate of production in 1942 was 99.6, compared with 99.5 of the capacity existing in 1941.

Wheeling Steel Reports Net Profit of \$4,441,964

••• The preliminary annual statement of Wheeling Steel Corp. disclosed a consolidated net profit of \$4,441,964 for 1942. The result, which is after all charges, is equal to \$4.61 a share on the common stock and compares with \$8,506,304 or \$11.71 a common share reported for the year 1941.

Federal, state and local taxes were \$9,254,367, including \$6,650,000 for Federal income and excess profits taxes, while the 1941 deduction for taxes was \$10,336,567 of which \$7,375,925 was for Federal taxes.

Wickwire-Spencer Dividend

••• At a meeting held Jan. 28 directors of Wickwire Spencer Steel Co. declared a dividend of 50c. a share on the common stock payable March 1, to stockholders of record at the close of business Feb. 15. The directors also authorized immediate payment of \$250,000 on long-term bank loans which anticipates fixed amortization payments due July 1, 1943, and Jan. 1, 1944. This is in addition to payment of \$125,000 made on Jan. 1, 1943, which will leave a balance of \$875,000.

Jones & Laughlin Profit in '42 \$10 Million

••• Jones & Laughlin Steel Corp. and its subsidiaries reported net profit for the quarter ended Dec. 31, 1942, of \$2,550,257 compared with a profit of \$4,234,599 reported for the quarter ended Dec. 31, 1941. The preliminary report also indicates net earnings of \$10,020,443 for the year 1942, compared with \$16,274,983 for the year 1941.



**"You have confidence in us
and we have confidence in you"**

Yes, we have great faith in the ability and daring of our paratroops. They have already proven themselves in North Africa . . . and they may soon be dropping in on Berlin!

Our fighting men have confidence that the "soldiers of production" will do their part back home. Let's justify the confidence they are placing in us . . . every day, every hour . . . till the war is won!

THE GARLOCK PACKING CO., PALMYRA, NEW YORK

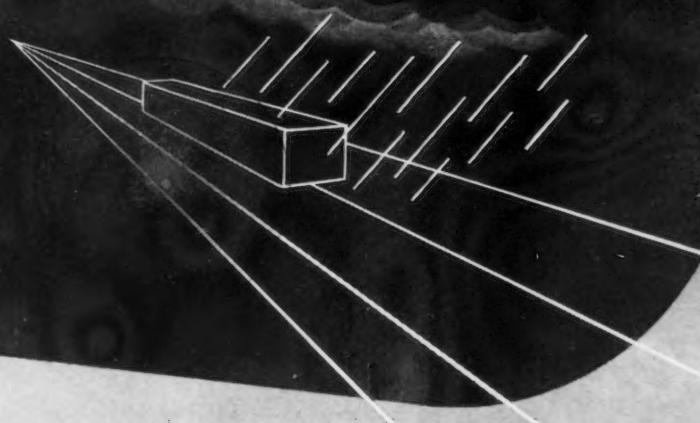
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ONE OF THE FAMILY OF ARISTOLOY STEELS

To conserve nickel and chromium, all industry is cooperating to limit the use of stainless steels to vital applications where only stainless will do the job. For such applications Copperweld Steel Company is furnishing Aristoloy Stainless steel bars and billets. We'll be glad to discuss your stainless steel applications with your engineering staff.

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AIRCRAFT QUALITY STEELS

NITRALLOY STEELS

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STEELS

ALLOY TOOL STEELS

STAINLESS STEELS

BEARING QUALITY STEELS

Briefly Told—

Ore Road's Engines
Loaned to Other Lines;
Other Industrial News

• More than 700 steam locomotives have been leased by railroads with a surplus of motive power to other roads in need of additional power to haul war-swollen traffic, the ODT said recently. Officials cited the leasing of

locomotives by the Duluth, Missabe & Iron Range Railway as an example. When the navigation season on the lakes closed, the road leased 20 locomotives to other railways, virtually stripping itself of freight motive pow-

er. Four huge engines were sent a thousand miles west to the Denver & Rio Grande Western Railroad.

• Bausch & Lomb, Rochester, N. Y., has announced a new retirement income plan under which each retiring employee will receive monthly payments for life amounting to 30 per cent of his monthly pay when combined with his social security payments. No contribution toward these payments will be required of any employee earning up to \$250 monthly.

• Shipments of the Whiting Corp., Harvey, Ill., are currently at a rate of about \$15,000,000 annually, as compared with a volume of \$3,500,000 in 1939-40, H. D. Grant, president, reported. Crane production has been increased from a pre-war rate of one crane a week to a current rate of one crane a day.

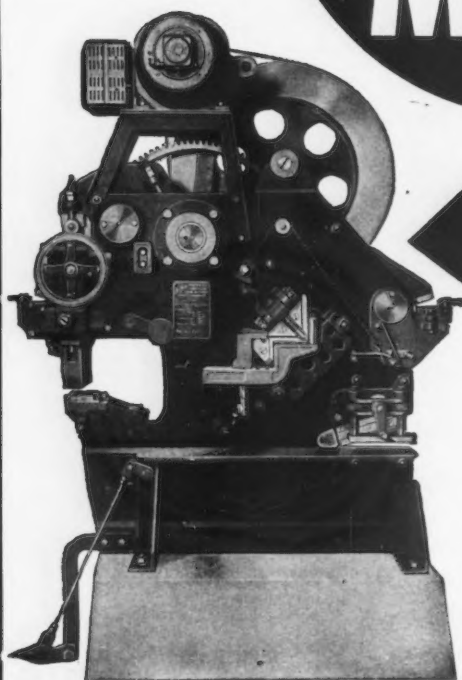
• New industrial facilities established in the Chicago area in the past month were valued at \$1,649,150, according to the Chicago Association of Commerce. In addition, two new concerns opened plants here. The two new companies are Affiliated Engineering Co., and the Tarnowski Mfg. Co. Both companies operate precision machine shops.

• Accidental injuries and deaths took such a toll from the war effort last year that unless industry solves this problem itself, the government will have to step in and do it, William A. Irvin, former president of U. S. Steel Corp. and national chairman of the War Production Fund to Conserve Manpower declared last week in an address before the Chicago chapter of the fund. Accidents in 1941 accounted for 94,000 deaths and 4,000,000 persons disabled, resulting in a loss to the war effort of 500,000,000 man-days, he said.

• The launching at Kearny, N. J., last week of the U.S.S. Appalachian added another new 10,000-ton naval auxiliary craft to the series being speeded to the Navy through the conversion of C-2 cargo ships to war time purposes in the shipyard of the Federal Shipbuilding and Dry Dock Co.

• At least some of our key armament facilities should be maintained in a standby condition, after the war, ready to function if the country is ever again menaced by foreign breeders of war, in the opinion of Major General Levin H. Campbell, Jr., U. S. Chief of Army Ordnance. Main speaker before 800 persons at the annual Pittsburgh Chamber of Commerce din-

MAKING

Every
SECOND COUNT
MORE

The speed and versatility of the Buffalo Universal Iron Worker is little short of phenomenal! This husky metal-working tool, with simple controls, can be put to work on practically all kinds of stock—such as angles, tees, channels, I-beams, rounds, squares, flats and plates. It assures rapid, accurate punching, shearing, slitting, coping or notching. Here's a production tool that makes every second count more—plenty more!—in Industry's urgent war effort.

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UNIVERSAL IRON WORKER





between two worlds...

AMERICA today is in the greatest period of transition of any nation at any time in history. We are between two economies, two ways of life, two worlds.

They are vastly different, those two worlds. One we know all too well. That one is the pre-war world . . . and the other we're scarcely able to visualize. It is the post-war world of tomorrow.

But there is much about the post-war world that can be visualized in the light of what is happening today, and behind the scenes of industry there are men who already know something of the nature of that world.

The most important thing that many of them see there is prosperity!

They see vastly less monopoly control, as international cartels, patent bottlenecks, restrictions of raw materials, and price maintenance are succumbing to the common cause of winning this war.

They see thousands of plants, small in pre-war days, emerging with capacity and a war-created efficiency. They see new techniques, new skills, new materials, new products . . . new competition based upon more plentiful supply and a lower price structure.

And lastly, they see the greatest consumer market of all time, with billions in savings from war bonds and restricted buying, needing millions of automobiles, appliances, homes and heaven knows what.

If you are looking toward that kind of post-war world, the time to start your production planning is now . . . and in that there is one thing you can do:

Write to Bryant! Send us your internal grinding problems, and take advantage of the work which our engineers can do now to help you formulate production plans and tool up for the great new world that lies ahead.

**SEND FOR THE MAN
FROM BRYANT**



BRYANT CHUCKING GRINDER CO.
SPRINGFIELD, VERMONT, U.S.A.

ner in Pittsburgh last week, he said the Axis misjudged our ability to convert from peace to war.

• Following the policy of curtailing construction which does not contribute directly to the war effort, WPB announced Jan. 27 that projects having a total cost of \$56,344,612 were stopped during the week ended Jan. 22. This brings to \$1,271,195,509 the total

cost of all projects which have been stopped by either the programming agency or the WPB since Oct. 23, 1942, when the facility review committee of WPB was established to reappraise the essentiality of construction projects.

• The Maritime Commission recently announced approval of an arrangement between the Brunswick Marine Construction Corp. of Brunswick, Ga., and the J. A. Jones Construction Co.,

Inc., of Panama City, Fla., whereby the Jones Co. will take over management of Liberty ship construction work being done in one of the Brunswick yards.

• Canada's export trade in 1942 reached the all time high record value of \$2,383,000,000, or 50 per cent greater than any year of the first World War, Trade Commissioner MacKinnon reported recently.

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Ledaloyl
SELF LUBRICATING
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Powdered Bronze

When you design a new motive unit, give serious consideration to the use of self-aligning bearings. Properly designed and installed, they deliver excellent service plus the large saving they make in assembly operations.

When you want self-aligning bearings that are low in cost, yet tops in performance... specify JOHNSON LEDALOYL. This new development in powder metal-lurgy provides all the excellent bearing qualities of cast bronze but eliminates the expense of machining. In addition, LEDALOYL holds up to 35% oil by volume, thus assuring the right amount of lubrication in the right place, at the right time.

Why not investigate the possibilities of using LEDALOYL in your product? Complete information is available at no obligation. Write today.

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Listing over 2000 stock sizes of Johnson LEDALOYL for which we have tool and die equipment. Write for your free copy.

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BRONZE
HEADQUARTERS
NEW CASTLE, PA.

19 New Contracts Authorized by DPC

Washington

• • • Defense Plant Corp., RFC subsidiary, has authorized the following contracts:

Monsanto Chemical Co., St. Louis, additional plant facilities in Texas, in excess of \$2,000,000, making a total commitment of more than \$15,000,000.

Bechtel-McCone-Parsons Corp., Los Angeles, additional facilities at a plant in Alabama, in excess of \$1,150,000, making a total commitment of more than \$13,700,000.

General Motors Corp., Detroit, machinery and equipment for a plant in Michigan, in excess of \$12,000,000.

Douglas Aircraft Co., Inc., Santa Monica, Cal., additional facilities in California, in excess of \$1,565,000, making a total commitment of more than \$10,600,000.

Briggs Mfg. Co., Detroit, additional equipment for a plant in Michigan, in excess of \$700,000, making a total commitment of more than \$5,700,000.

Root Petroleum Co., Shreveport, La., additional plant facilities in Arkansas, in excess of \$980,000, making a total commitment of more than \$4,480,000.

Liberty Aircraft Products Corp., Long Island, N. Y., additional facilities for a plant in New York, in excess of \$180,000, making a total commitment of more than \$2,170,000.

Wenatchee Alloys, Inc., Canton, Ohio, additional plant facilities in Washington, in excess of \$120,000, making a total commitment of more than \$1,250,000.

Air Reduction Sales Co., New York, plant facilities in Texas, in excess of \$350,000.

Diamond Iron Works, Inc., Minneapolis, additional equipment in a plant in Minnesota, in excess of \$125,000.

Lombard Iron Works Co., Augusta, Ga., equipment in a plant in Georgia, in excess of \$90,000.

Buffalo Arms Corp., Buffalo, expansion of a plant in New York, in excess of \$100,000, making a total commitment of more than \$14,000,000.

Vultee Aircraft, Inc., Allentown, Pa., plant facilities in Pennsylvania, in excess of \$4,000,000.

Babcock & Wilcox Co., New York, additional equipment in a plant in Ohio, in excess of \$170,000, making a total commitment of more than \$2,700,000.

Westvaco Chlorine Products Co., New York, additional plant facilities in California, in excess of \$200,000, making a total commitment of more than \$900,000.

Tung-Sol Lamp Works, Inc., Newark, additional plant facilities in New Jersey, in excess of \$330,000, making a total commitment of more than \$700,000.

Singer Mfg. Co., New York, machinery and equipment in a plant in New Jersey, in excess of \$500,000.

Weston Electrical Instrument Corp., Newark, equipment in a plant in New Jersey.

Bonds Mill Distilling Co., Lawrenceburg, Ky., equipment in a plant in Kentucky.

EVERY SUB COMMANDER
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Centralized Control



Instant response — unfailing action in every mechanical element of the ship — is vital to protect the lives of the crew as well as giving striking power to the submarine. From his station, the commander skillfully directs its performance through centralized control equipment.

★ ★ ★

The centralized controls of Milwaukee Milling Machines give the operator complete command of his machine — enable him to control its performance to the fine degree he demands for the full expression of his skill.

Speed and feed dials — all control levers within easy reach — the latter duplicated front and rear on plain and universal horizontal machines (model 2K and larger) — contribute to the sustained precision of Milwaukees, in the tool room or on the production line.



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Buy Victory with at least 10% in War Bonds!

Milwaukee

M A C H I N E T O O L S

Unions Seek to End 15% Wage Ceiling; Key War Jobs Sought

• • • Most ominous action underway this week on the labor front is what appears to be a concerted drive by nearly all union forces to push wages upward above the "little steel" 15 per cent yardstick basis which WLB has diligently tried to stick by.

The move seems likely to be led

by John L. Lewis who already has stated his intention of breaking this ceiling on wage increases by asking for as much as a \$2 a day increase for his miners. Phil Murray also has announced his intention of asking increases above the 15 per cent level as have the railroad brotherhoods and most recently the garment workers.

This concerted move is backed by apparently sound, if one-sided, reasoning inasmuch as living costs which are the determining figure in wages these

Transfer of Japanese Will Provide Workers

Cleveland

• • • The Japanese are coming to Cleveland — but peacefully. The opening of a regional office of the War Relocation Authority to supervise the transfer of Japanese from relocation centers in the West to jobs in Ohio, Michigan, and West Virginia, was announced this week. In charge of the regional office is Harold S. Fistere. The Cleveland area will be in charge of Fred W. Ross.

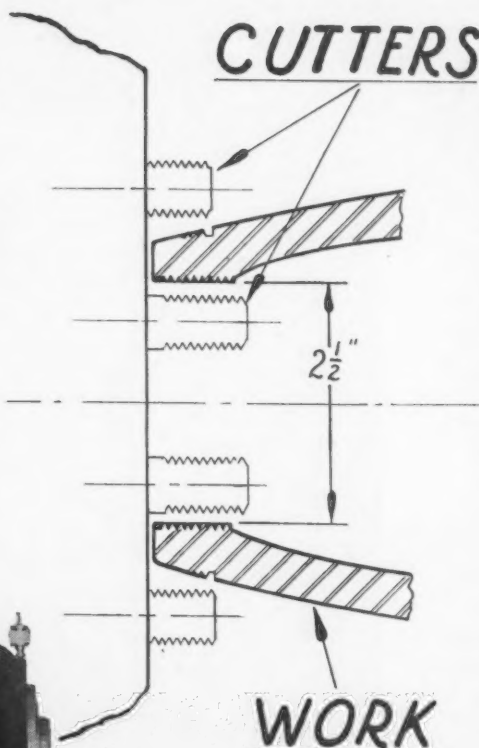
The WRA, Mr. Fistere said, will cooperate with employers wishing to avail themselves of this labor. The relocation is purely voluntary on the part of the individual involved and subject to acceptance on the part of person with whom they will work.

PLANATHREADING

Here's something worth noting! Two threads, one internal and one external, milled simultaneously. The place is on a Hall Planetary.

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High accuracy is assured, of course. Some of YOUR threading jobs could best be done this way.



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days have risen an admitted 4 per cent overall since May of 1942 and food costs which represent about 40 per cent of the average family's outlay have risen 9 per cent in the same period. Director of Stabilization Byrnes also is said to have admitted that living costs could be expected to rise 1/2 per cent a month. These factors seem to point to the unfairness of the present 15 per cent wage-increase ceiling, yet to break this ceiling means a faster spiraling of these costs which can only lead to further wage demands later.

One of the first bits of legislation aimed at control of unionism is now being introduced to the House. This will subject labor unions to the terms of the Anti-Racketeering Act of 1934 and is designed to put a stop to rough-house tactics of strikers and sympathizers and the impeding of interstate shipments.

At the same time the Colorado state legislature is preparing to consider a union-control bill so controversial that Supreme Court action to settle its constitutionality is expected. This bill would force unions to incorporate within the state, outlaws sympathy strikes or boycotts, limits excessive dues, demands yearly elections of union officers, bans use of union funds for political purposes and requires responsibility of the union for the results of any acts of violence, etc.

Meanwhile, AFL leaders meeting in Miami are demanding a greater part in the management of war production and are seeking key jobs for labor on the Requirements Committee, OCD, Program and Facilities Bureau,

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Procurement Policy Committee and such other committees on production and labor affairs as may be created.

At least three separate investigations of the manpower situation seem imminent in Congress with the Senate Military Affairs Committee and the Appropriations Committee already empowered to act and Senator Pepper seeking a resolution which would empower the Education and Labor Committee to also proceed in this direction. The three groups are expected to cooperate.

Union Hostile to New 7th Day, Double-Time Rule

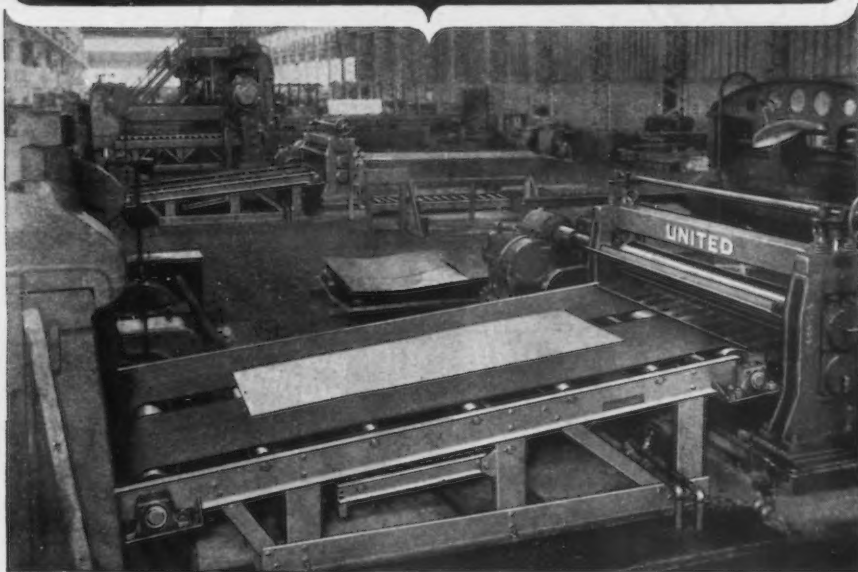
Pittsburgh

• • • Philip Murray, president of the CIO, has charged that "to permit the Secretary of Labor to handle the problem of double-time on the seventh day constitutes a menace to the labor movement, continuity of war work, and maximum production in war plants," and has asked President Roosevelt to take this problem away from the Secretary of Labor.

Mr. Murray's ire was raised by a new interpretation of the double-time ruling issued by the Secretary of Labor under date of Jan. 27, 1943. Under this new interpretation, double-time is required on the seventh consecutive day of work in the work week, and the work week is described as consisting of seven days starting with the same calendar day each week. Although seven consecutive days are worked, if a day of rest is afforded in each work week, double time is not required.

In the original interpretation, payment of double-time for work on the

Mechanical handling BOOSTS MILL CAPACITY



★ LOGAN DELIVERY BELT CONVEYOR in modern steel mill. Delivers sheets from flying hear to piler unit at right (not shown). A duplicate set-up is in background.

GREATER mill capacity results when production units are tied together into a smooth working whole by means of conveyors. In many of the nation's leading steel mills rugged Logan conveyor systems are feeding strip, sheets and coils into and away from processing units, keeping an ever-ready supply of work ahead of each mill operation and eliminating wasteful hand handling by workmen. For suggestions on using conveyors to boost your mill capacity, why not call in your nearest Logan engineer?...or write Logan Co., 545 Cabel Street, Louisville, Kentucky.

Logan Conveyors

PUT FLOW INTO PRODUCTION

Ruling Issued Limits Seventh Day Double Pay

• • • Double-time pay for the seventh consecutive day's work can now be paid only if all seven days fall within the same work week, according to a new ruling by Secretary of Labor Francis Perkins. The purpose behind the ruling is said to be the desire to limit seventh day employment and thus enable workers to have one day's rest each week.

seventh consecutive day was required, regardless of whether all days fell in the same work week.

The original interpretation allowed the working of seven consecutive days on many work schedules which were satisfactory to employer and employee alike, and therefore provided that double time need not be paid for the seventh consecutive day in mutually satisfactory work schedules which afforded one day of rest in each work week.

Many companies had established mutually satisfactory seven-day schedules with time off at the end of this period which ordinarily would not have required double-time for the seventh day, in that they had been mutually satisfactory to employer and employee. In most of these cases, however, the union stepped in and demanded that the seventh day be double-time, thus indicating that the schedule was not mutually satisfactory. This caused these companies to rearrange their schedules, even though the employees were satisfied with previous ones, to new tours of duty not requiring seven consecutive days.

Mr. Murray has demanded that Sec-

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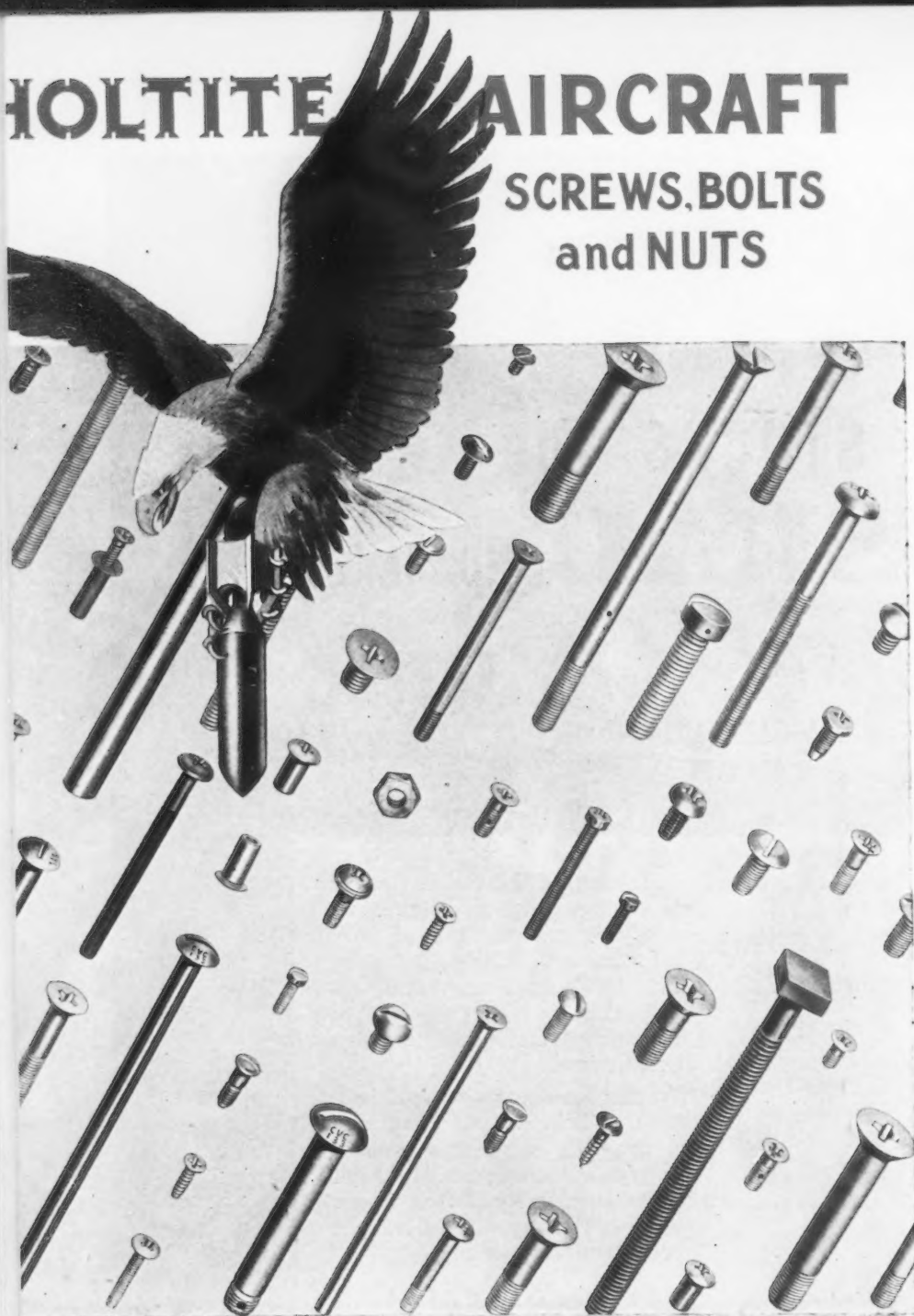
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Skillfully made from selected materials, HOLTITE Aircraft fastenings are gauged and inspected throughout each stage of production by a separate corps of specially trained inspectors. Heat treating,

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MANPOWER

retary Perkins reinstate the original interpretation and charges that her department has caused serious confusion in American industry, and at the same time is hostile to organized labor.

No Victory Tax Payment On Retroactive Pay for '42

Washington

• • • The 5 per cent victory tax need not be withheld on those portions of retroactive wage or salary awards or approvals of the NWLB or the Commissioner of Internal Revenue, which cover work done in 1942, it was announced recently. "Whether the 5 per cent tax will ultimately be collected on such retroactive pay is a matter to which Congress may give its attention during the current session," the statement added.

Bethlehem Hires Women Bricklayers' Helpers, Painters

Buffalo

• • • Hiring of women as bricklayers' helpers, dip painters and plant cleaners was begun this week by the Bethlehem Steel Company in nearby Lackawanna. General Manager Edward F. Entwistle said it was planned to hire "hundreds" of women to replenish workers' ranks thinned by the draft and transfers to lighter industries.

Foundry Work for Women Approved by Committeemen

Milwaukee

• • • Women can safely and efficiently do the work of men in foundries if given adequate training and supervision as well as proper clothing and protective equipment and should be paid the same wage scale as men. This is the conclusion reached by the war problems committee of the Wisconsin chapter of the American Foundrymen's Association, headed by William J. MacNeill, president of Federal Malleable Co., Milwaukee.

Figures Corrected On 1943 Steel Chart

• • • Figures appearing in the article "1942," by T. W. Lippert, published in the Jan. 7, 1943, issue of THE IRON AGE, in the chart titled "1943 Flow Chart of Steel Production," on page 52, have been corrected as follows: Limestone, 27,432,000; coal, 88,173,000; coke, 61,721,000; raw materials, 231,084,000.

Navy Adopts Policy of Using More Fixed-Price Contracts

Washington

••• Discarding of cost-plus-fixed-fee contracts and substitution of fixed-price contracts, wherever possible, was announced last week by the Navy Department.

Doing away with the cost-plus-fixed-fee policy has become much easier, it was stated, because the manufacture of war materials now has progressed to the stage where many firms have discovered that they are able to reduce operating costs as they learned new "short-cut" methods of assembly-line production. Hence, it is easier to anticipate costs and producers are in a better position to bid on projects at or near cost values.

In the future, the Navy announcement said, when suppliers insist on cost-plus-fixed-fee contracts, the fees allowed are to be lower than heretofore. At the same time, the Navy will continue to recognize the importance of cost-plus-fixed-fee contracts in certain types of experimental production.

The Navy said several pricing methods are being used, depending upon the field in which they are needed. Pricing formulas being used or studied, it was said, have the objectives of putting upon the contractor the responsibility for controlling costs, and avoiding the need for a large, expensive Navy cost-inspection force.

Meanwhile the Services of Supply

of the Army has established a policy regarding companies that have overextended their resources.

Names of companies appearing to have true claims of overextension are to be given by chiefs of military supply units to the War Department Price Adjustment Board for consideration. When the nature of the articles being manufactured will permit, overextension can be reduced by curtailing prospective volume of business.

New Regional Offices To Aid Small War Firms

••• Twelve regional offices, headed by deputy regional directors, and 131 district offices, empowered to take action on the spot, have been established under the new decentralization plan of the Smaller War Plants Division.

Representatives will work directly with distressed plants and district procurement officers of the Army and

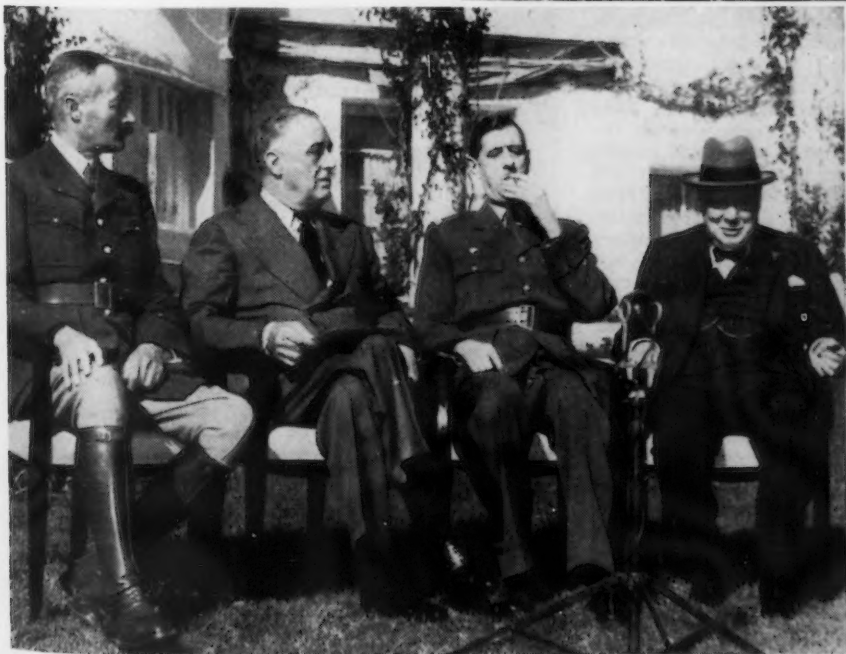
Navy and other agencies. Thus, the problems of small business will be met at the source.

Operators of distressed plants have been asked to furnish immediately simple information regarding their organizations and to mail the answers to ten questions to their nearest WPB office. The questions are:

Firm name and full address; kind of business and products normally produced; kind of war work you are equipped to handle; average number of employees a year ago and now; dollar value of factory sales in 1941; dollar value of factory sales, by months, for past six months; dollar value of business of all kinds on hand now; a general description of equipment; kind of war work on hand, if any, and how much; if your labor force has been depleted, to what extent can it be replenished.

Charles H. McArthur, chief, field service branch, will supervise the regional setup. The deputy regional directors follow:

Region I, Boston, Richard Cooke, telephone, Lafayette 7500; Region II, New York, H. P. Ingels, Murray Hill 3-6805; Region III, Philadelphia, A. Whittemore, Locust 340; Region IV, Atlanta, T. A. Falvey, Walnut 4121; Region V, Cleveland, D. P. Ford, Cherry 7900; Region VI, Chicago, L. A. Miller, Andover 3600; Region VII, Kansas City, R. W. Webb, Victor 7780; Region VIII, Dallas, J. B. Joyce, Riverside 5711; Region IX, Denver, R. W. Gordon, Tabor 3173; Region X, San Francisco, O. L. Starr, Klondvke 22300; Region XI, Detroit, H. A. Weissbrodt, Trinity 24900; Region XII, Minneapolis, R. C. Duncan, Main 3244.



WAR LEADERS of three nations sit on a sunny lawn at Casablanca, French Morocco, for an historic conference. Left to right: General Henri Honore Giraud, High Commissioner of French North Africa; President Roosevelt, Gen. Charles de Gaulle, leader of the Fighting French, and Prime Minister Churchill of England. Above, the President reviews a tank unit.

Glass Gages

(CONTINUED FROM PAGE 39)

chanical strength and chemical stability for gage service. Whether the compositions ultimately deemed best suited will be transparent is questionable. It might be that certain constituents would be required in such quantities as to make the glass opaque or dark in color. This would not be considered as being an important factor in the overall utility of glass for gage service.

In general, tool steel gages are not expected to be particularly resistant to corrosion; nevertheless, it has been necessary to protect them from excess moisture or perspiration and subsequent rusting by greasing or oiling them. This would not be necessary with glass gages, because chemical stability can be incorporated to such a degree that the glass composition will withstand indefinitely the corrosive action of the most powerful mineral acids (except hydrofluoric).

Wear Tests

Some wear tests on glass gages have been made at one of the ord-

nance contracting plants in the Middle West. In one test set-up, a hardened and ground plug gage was mounted in the tool post of a shaper and was passed in and out of a glass ring gage held in a vise. Fig. 8 shows the original dimensions of the ring at three points. After 100,000 passes, a slight bell mouth (0.0002 in.) had developed at the points A and C of the glass gage, but no wear was recorded at the midsection B. After 200,000 passes, the following total wear was observed:

Point	Wear, In.
A	0.0003 - 4
B	0.0005 - 8
C	0.00015 - 25

In testing a glass plug gage in actual inspection of a hole in a tough alloy steel, after 9650 parts had been inspected, the wear on the plug was as indicated below:

Point	Wear In.
A	0.00242 - 0.00264
B	0.00032 - 0.00038
C	0.0004 - 0.0008

Point A was $\frac{1}{8}$ in. in from the front end, B in the middle of the gaging length and C $\frac{1}{8}$ in. from the back end.

Steel plugs gaged approximately 10,000 parts before exceeding the wear limit on the plug.

On another plug gage of 0.547 +0.0002 -0.0000 in. size, the wear after gaging 2000 parts was as follows:

Point	Wear, In.
A	0.00019 - 0.0005
B	0.0000 - 0.0002
C	0.0000 - 0.0002

This plug gage was made of a hard, flint glass. At the end of the test run, one side had shattered and chipped considerably, one chip being $\frac{1}{4}$ in. wide and $\frac{1}{16}$ in. deep at the end of the plug, tapering down to $\frac{1}{16}$ in. wide at the in-board end. Redesign of this gage by the addition of a rounded pilot, Fig. 9, will overcome this chipping, which had not destroyed the functioning of the gage, incidentally.

Another plug gage, made of a soft, lead (optical) glass suffered the breakage of the handle after 700 parts had been gaged. For a +0.0002 nominal size of 0.250 -0.0000, before use it actually checked as follows:

Point	Diameter, In.
A	0.2499 - 0.2500
B	0.24998 - 0.25002
C	0.24985 - 0.24992

The program as now formulated calls for the various glass works to produce the blanks with approximately $\frac{1}{32}$ in. on the diameter of the ring and plug gages for removal by commercial and plant gage makers. The amount of metal left on the jaws of snap gages will probably be $\frac{1}{32}$ in. As time goes on and experience is gained, it is possible that it may become economically feasible to make the molded blanks with sufficient accuracy to reduce substantially the amount of finishing required. An example of this would be the use of precision shrinkage process for ring gages. With this process, i.d. variation can be held within 0.0002 or 0.0003 in.

Grinding of Glass

Despite the great difference in hardness, toughness and abrasion resistance of so-called "soft" and "hard" glasses, there is relatively little difference in the rates at which glass can be removed by grinding. It is necessary to correlate wheel speeds, depth of cut, and grit with the characteristics of the

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**Flexible High Speed Hand
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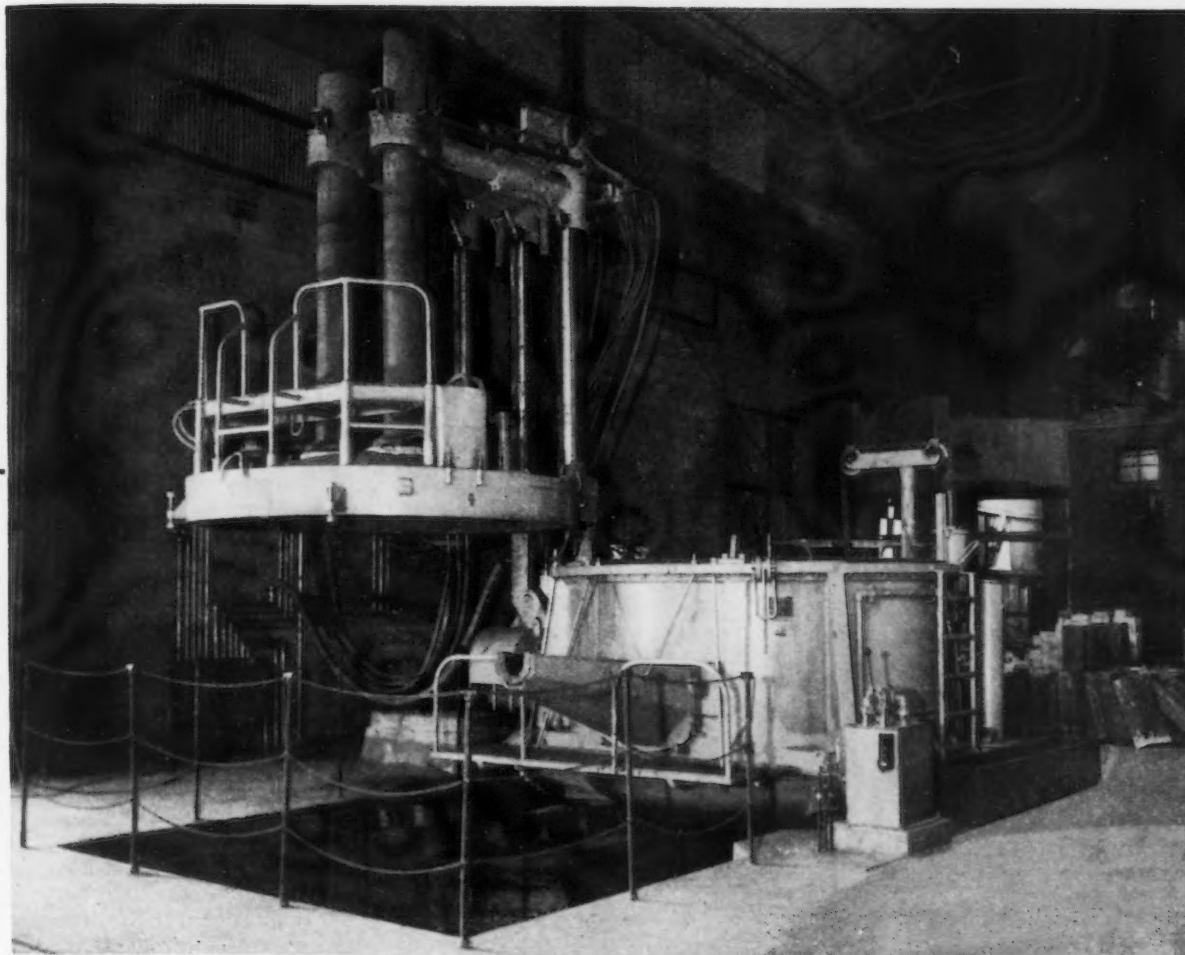
METAL CUTTING BAND SAWS

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BROACH SAWS**

That's because experience has proved the extra speed and efficiency of "the blades with generating cutting action." Specially designed teeth increase in pitch and height from starting end to the back—giving faster, freer cutting—preventing chatter and sticking. Super-Sterling Broach Saws don't scratch, they cut. Yes, and they stay in the frame longer. Ask your mill supply distributor about the complete line of Super-Sterling Metal Cutting Saws—or write Dept. A for details.

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reporting increased tonnage per man hour, lower consumption and savings in electrodes and refractories. They are built in standard sizes from 100 tons down to 250 pounds capacity.

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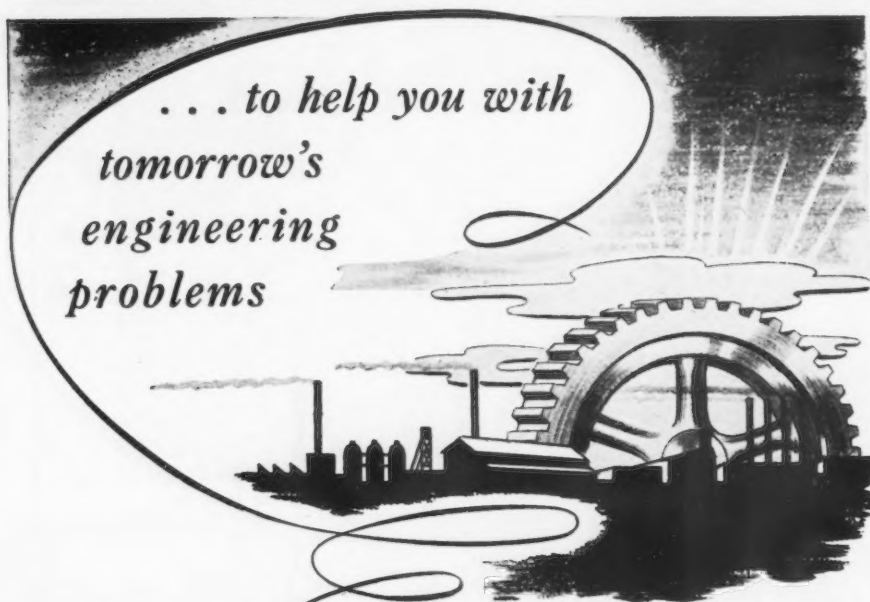
specific glass composition involved. For example, the hard boro-silicate glasses have great heat-shock resistance because of lower expansion coefficients; also, they have slightly higher thermal conductivity. Consequently, they tolerate grinding at rates sufficiently faster to nearly compensate for the softness and easier grinding of the "soft" glasses. It is possible however, that special glass compositions having the higher expansion coefficients necessary to match carbon steel, but in-

corporating toughness and abrasion resistance to the maximum degree, may be somewhat slower-grinding.

Listed below is specific data on wheels, speeds, etc., derived mostly from experience at Corning in grinding of hard boro-silicate glasses:

Grinding Wheels

Material	Carborundum
Grade	P & R
Bond	W E C
Size	1/2 x 2 in. up to 1 1/2 x 12 in.
Grit	60 - 80 - 100 - 150



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tomorrow's
engineering
problems

YESTERDAY American industry dropped what it was doing to take on an entirely new responsibility—the gigantic task of making tools of war—in most cases, an unfamiliar type of production.

Today we see the tangible evidence of America's typical ingenuity and spirit. We are glad to be sharing in this responsibility. Our large staff of over 500 qualified engineers is busy helping industry convert its equipment and facilities from peacetime to war production.

But tomorrow, what? American industry will cease its present production—just as suddenly as it was started—and revert to its former activity. But it will face a different picture.

New needs will have been recognized and improved designs, methods and practices will be born.

To this future day we, like all farsighted manufacturers, are setting our sights.

Faced with engineering problems of most extraordinary character, we have naturally accumulated a great wealth of unparalleled experience, which added to the extensive experience we already possessed, enables us to make an exceptional contribution to industry—now and later.

ENGINEERS
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Grinding Procedure

Wheel speed, ft. per min.	350 to 2400
Recommended depth of cut, in.	0.003 to 0.005
Work speed, r.p.m.	90 to 120
Traverse speed, in. per min.	10 to 25
Coolant or lubricant	Soluble oil

In arriving at the best combination of wheels and speeds for fastest grinding, care should be exercised to stay under the grinding rate which results in "firing" or sparking. When firing occurs, it is apt to cause checks or microscopic cracks in the glass and these have a weakening effect.

Diamond wheels, particularly those bonded with tungsten carbide, have promising possibilities for glass finishing but to date, techniques fully utilizing their properties have not been thoroughly developed.

Design of the set-up for holding the glass blank in the grinder should take into account the modulus of elasticity of glass. In general, this is only one-third that of steel, and flexure under load is, accordingly, three times as great. When chucking plug-gage blanks, for example, the overhang should be reduced to the minimum even though this might require a narrower wheel.

Furthermore, clamping stresses should be held to a minimum. Glass has no crystal slip-planes along which local deformation can take place when the elastic limit is exceeded. Instead, it crushes under "point loading" or at regions of high stress concentration.

For lapping or polishing to close dimensional limits, rouge is excellent. But in those instances where required tolerances can be attained by grinding an excellent surface finish, almost polished, is readily attainable in glass by proper selection of wheels and speeds.

Minimum Freight Car Weights Recommended at Meeting

Washington

• • • Plans for heavier freight car loadings on a number of commodities have been worked out at a meeting in Washington between members of the container division transportation industry advisory committee and representatives of the division.

Members recommended minimum freight car weights for various commodities. The views will be passed on to the Office of Defense Transportation for incorporation, if approved, in a special directive.



Style 12

KENNAMETAL* REPRESENTS MORE THAN ITS INGREDIENTS

★These strong, hard and efficient steel-cutting tools required in their making more than merely the material ingredients.

Another essential ingredient was the protection and encouragement guaranteed under the Constitution of the United States of America to all citizens, including the men and women who make these tools.

The Constitution also provided for the establishment of a patent system to secure to inventors, for a limited time, the exclusive right to their discoveries, and it was in reliance upon this encouragement and guarantee that, from 1936 to 1938, Kennametal was invented and perfected by the founder of McKenna Metals Co., as described in U. S. patents.

It is also because of provisions in the Constitution which guarantee freedom of trade that it is possible to introduce and sell Kennametal to machine shops in every state in the Union, as well as to those in allied countries.

American citizens are free because our form of government is based upon a Constitution which includes the Bill of Rights, and which provides for the making of laws by representatives in the Congress whom we elect.

We are proud in the knowledge that, in this national emergency, we have added strength to our country, and have made possible the more rapid production of arms.

That this new tool material was developed at this critical time was providential, but it would not have been possible without initiative which is characteristic of free men, and the independence of action guaranteed them by the Constitution.

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The Constitution

The Constitution of the United States separates the powers, the rights, and the freedoms of the legislative, judicial, and executive branches of the government.

Article I Section 8, Clause 8

The first article of the Constitution proper preserves the property rights of inventors stating—"To promote the general welfare . . . to promote the progress of science, by securing for a limited time to inventors the exclusive rights to their discoveries."

The Bill of Rights

The Bill of Rights, composed of the first ten articles of amendment, preserve the specific rights and freedoms of the American people as individuals.



CMP...

Procedure at Mill Level Ex

Washington

• • • The CMP review this week deals with contracts and purchase orders at the mill level and a discussion of the "B" list. Present prevailing WPB ideas are expressed, but it should be understood policy changes may occur before procedures are formally established. However, the material represents educational efforts of WPB in training CMP experts and has received qualified approval of proper authorities.

At the mill level, existing procedure is tied in with allotments and production directives. The latter are determined by producing capacity, the demand for controlled materials as expressed through mill loads, and the availability of raw materials, and are expressed in terms of the minimum of each product that is to be produced. Consumers are controlled through allotments — producers through directives.

Controlled materials divisions are able to reconcile demand with production through receipt of claimant agen-

cies' requirements broken down showing tonnages needed for each product. With the aid of this information the WPB Steel Division can approve intelligently the issuance of allotments by claimant agencies. Final approval, however, must be given by the WPB Requirements Committee.

To insure adequate statistics for control through directives, the WPB Steel Division will receive and tabulate certain designated forms. The forms used are designated CMP6-S-1, CMP6-S-2 and CMP6-S-3. CMP6-S-1 is used with new orders for steel or to validate orders previously placed with producers. CMP-S-2 is used by the producer to cancel or revise orders and CMP6-S-3 is used by warehouses to accompany orders covering stock replacement.

All forms are to be prepared in triplicate and must accompany each order placed with a producer. They give data with respect to tonnage, products, months of delivery and complete allotment number. The producer accepts or rejects the order or items

on the order, returning a copy of the form to the consumer with acceptance or rejection, giving the reasons. The producer also sends one copy to WPB.

On accepted tonnage the copy sent WPB is tabulated by a punch card system displaying by month, product and producer, the tonnage to be charged against the claimant agency or industry division.

When the tabulation is related to production directives or capacities in one case, it gives a picture of mill conditions; when related to allotments, it gives the status of claimant agencies or industry divisions with respect to the relative balance of their programs.

In the case of copper, CMP6-C-1 is used for the same purpose as the related steel form, but also applies to orders placed by consumers with warehouses. CMP6-C-2 and CMP6-C-3 are used similarly to the steel forms. The copper plan varies from steel in that forms are not issued for rejected items or orders. Also to avoid duplication of tonnage the CMP6-C-1 forms

Handling of Details Under CMP Explained

Listing of Class B Items on CMP-3

Form CMP-3 is used in the preparation of a bill of materials for the listing of Class B—Group I items.

Some confusion has arisen concerning the listing of Class B—Group II components. Whether a manufacturer is a Class A producer preparing a bill of materials at the request of a claimant agency or whether he is a producer of a Class B product preparing a bill of materials at the request of an industry division, he is not required to list Class B—Group II items or components. The listing on form CMP-3 must be confined to Class B—Group I products.

Use of Allotments

Discussions in recent meetings of the CMP division committees on records, accounts, and reports have indicated the need for a clarification as to the proper use of allotments and designated allotments.

Manufacturers who receive an allotment of a given quantity of controlled materials for a specified purpose must use an equivalent amount of material for that purpose, but this does not mean that the actual material delivered on the basis of the allotment must be so used. It is permissible to fill orders accompanied by allotments out of inventory, and to use the allotments to replenish inventory. CMP does not require the segregation of material inventories by products or contracts.

CMP Code versus Red Book Code

Because a great many concerns have already established punch cards on IBM equipment based on the Red Book Code, the question has arisen as to whether or not requirements would be acceptable on that basis.

For purposes of presenting requirements to the requirements committee it is necessary that claimant agencies present such requirements in the terms of the CMP materials list code. This code was designed so that the Red Book Code could be used and "folded in" with the CMP code. Whether this folding in process is done by the claimant agency or by the manufacturer is immaterial as far as the requirements committee is concerned.

Each claimant agency should make arrangements with manufacturers to suit their mutual convenience in this respect but it must be borne in mind that the requirements as presented to the requirements committee must be in the terms of the CMP code.

Integrated and Non-integrated Mills

Some question has arisen concerning the procedure to be followed where a mill is also a fabricator of either a Class A or Class B product in addition to being a producer of controlled materials.

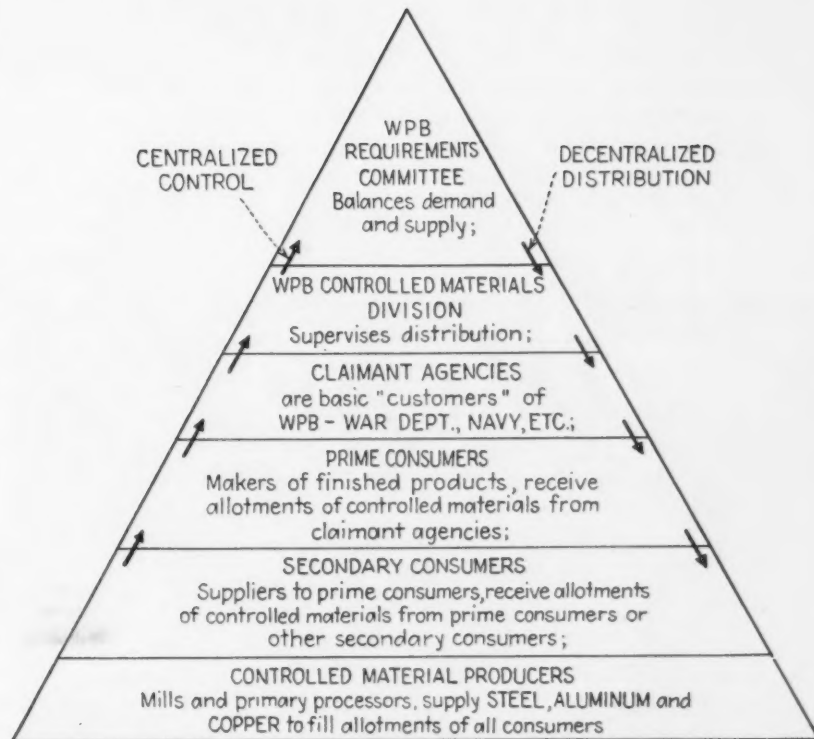
For the purposes of CMP operations, such a mill becomes a producer of the Class A or Class B product and must file applications or bills of materials for such products when requested by the appropriate Claimant Agency.

Explained; and Class B List Discussed . . . CMP

covering shipments by warehouses are not included in tonnage totals. The Copper Division does not employ Production Directives except for ammunition and each mill is advised of the maximum amount to reserve for this purpose for each claimant agency.

CMP5-A-1 and 6-A-2 forms are used by the Aluminum Division. The first is prepared in duplicate for both orders entered with producers and warehouse. Since manual tabulation is employed but one item may be shown on a form. Acceptance or rejection are both reported. A 6-A-3 form has not been prepared and no determination has been made as to whether it will be used. Production directives will differ from steel or copper, but plans have not been completed.

In the case of an order or item rejected by a steel producer, it is the prime obligation of the consumer to arrange for placement of the tonnage elsewhere. The Steel Division can render assistance, if requested by the



A BALANCING PLAN: Centralized Control and Decentralized Distribution are Featured in CMP.

Shipping Order Precedence

At various classes and meetings held on CMP it has been stated that the controlled materials suppliers would fill orders in accordance with date of receipt of order.

As a matter of practical application it should be understood that no order of precedence can be established for orders specified for shipment within a specific month. In general, producers can best work out with their customers the shipping schedules within a given month. The mill goes to controlled materials division to resolve schedule in case of conflict at the mill level.

Aluminum Forms and Shapes

The following procedure has been established governing the forms and shapes in which requirements for aluminum will be stated and the forms and shapes in which aluminum will be allotted:

(a) In the case of bills of materials, aluminum requirements will be stated in the forms and shapes set forth in the General Instructions on bills of materials.

(b) Each claimant agency will present its requirements for aluminum to the aluminum division and to the requirements committee, in the forms and shapes listed in the general instructions on bills of materials.

(c) Allotments will be made by the requirements committee to the claimant agencies in the following eight forms and shapes:

(1) Sheet, strip, plate and foil; (2) Rod, bar, wire and cable; (3) Castings; (4) Forgings, pressings and impact extrusions; (5) Shapes, rolled or extruded; (6) Ingot and powder; (7) Tubing; (8) Rivets.

(d) Each consumer will state his requirements for aluminum in his application for allotment in the eight forms and shapes listed above.

(e) Allotments of aluminum shall be made by the claimant agencies, industry divisions and consumers in the eight forms and shapes listed above.

The aluminum division will issue, from time to time, restrictive directives to Claimant Agencies with respect to certain forms and shapes where production limitations make this advisable.

AAA Preference Rating

Controlled materials producers are prohibited from making deliveries on and after July 1, 1943, of controlled materials to fill orders other than those bearing allotment numbers (except as otherwise directed by the controlled materials divisions and subject to certain exceptions in the case of small orders and warehouse orders). This prohibition applies to all orders including those bearing a preference rating of AAA.

Consideration is being given to special provisions covering deliveries of controlled materials to fill small orders and warehouse orders without allotments but subject to preference ratings. No definite decision on this subject has been reached.

In cases of urgency where producers are unable to fill orders for controlled materials on schedule, the matter should be referred to the appropriate controlled materials division. The controlled materials divisions have the authority to issue specific directions covering the production and delivery of controlled materials. The use of an AAA rating would be wholly ineffectual in such a case.

consumer, through the tabulated reports prepared daily reflecting mill loads of the producers.

The "B" list, published Dec. 21, 1942, contains four general types of products. The types are: (1) Civilian type end products like farm machinery and sewing machine needles; (2) industrial machinery and equipment which are sold to thousands of firms, except where these are specially designed and installed in conjunction with construction projects; (3) prod-

ucts which require very small quantities of controlled materials, such as wood furniture, apparel findings and (4) certain components like standard bolts and nuts, electric motors, etc., which are ordered in general, in small quantities, frequently from the shelf and whose producers supply many thousands of customers.

The general principle governing the preparation of the "B" list is that it should contain the products for which an allotment through claimant agen-

cies and prime consumer is impractical. A products, nearly all combat items, conform to the basic CMP process of allotment from claimant agencies to prime consumers, etc. B product manufacturers will receive allotments of all controlled materials required for their production needs directly from a single source—"the appropriate industry division of WPB—such as under PRP."

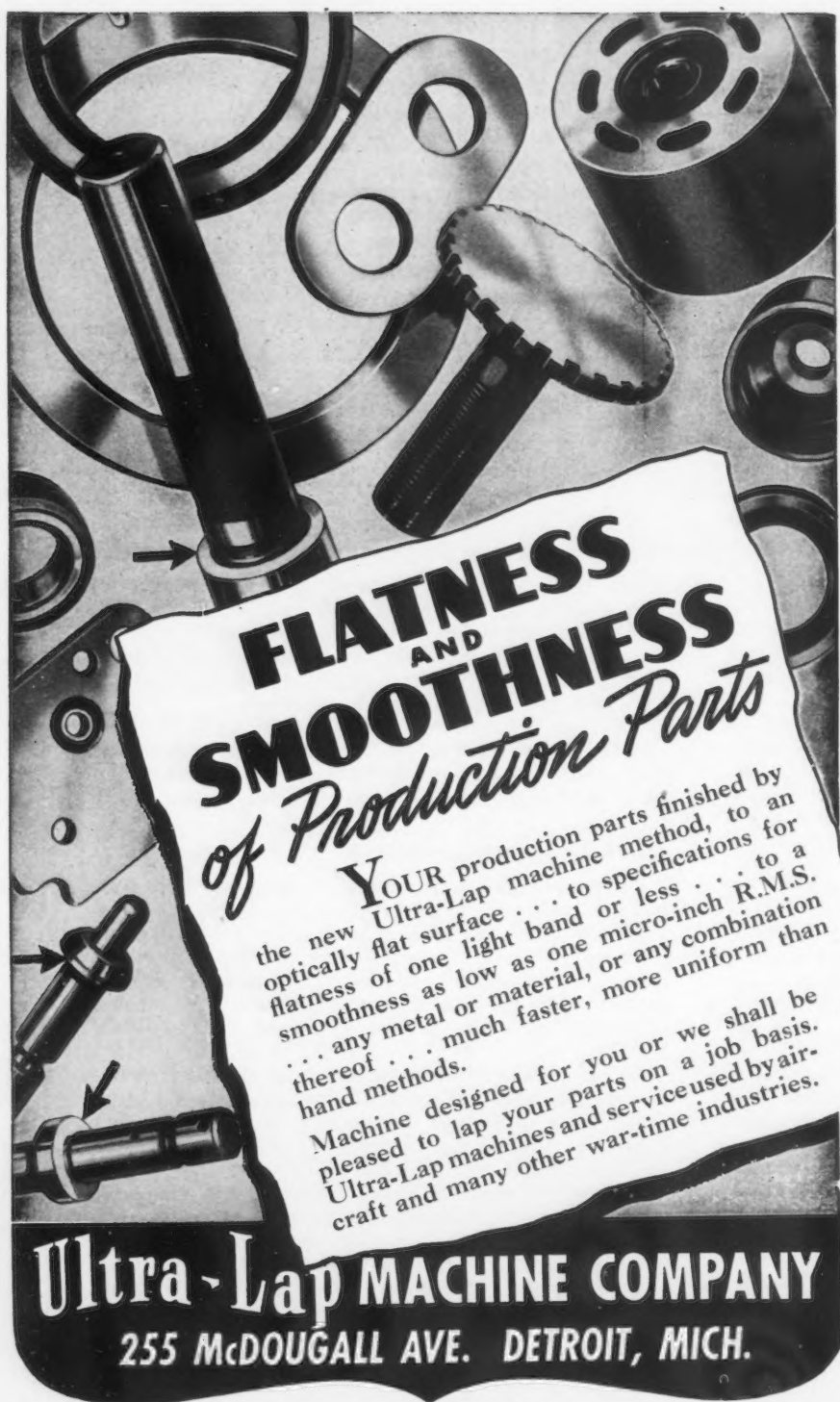
The B list is not said to be perfect. So it is to be expected that WPB will remove items and add some from time to time. WPB says it is difficult to find the dividing line between A and B products sometimes.

Each B product is assigned to a WPB "supervisory" industry division. This division is responsible for estimating requirements of its B products, using all information at its disposal and securing from claimant agencies and other industry divisions such assistance as they can give from their information regarding programs.

The supervisory industry division is also responsible: (1) for translating requirements for its B products into requirements for controlled materials, and (2) for allotting the controlled materials to prime consumers producing B products.

To facilitate the task of the supervisory industry division in estimating requirements for B products, some B components have been singled out for special treatment. These comprise the B-1 list. In the case of B-1 components, like compressors and internal combustion engines, it is necessary to secure estimates of requirements based on production programs and the number of such B components in the end-products in each program. That is why these components, that is those in Class B Group 1, must be reported on bills of materials on Form CMP-3. They must be listed in some appropriate unit, like dollars, total H. P., or number, which will permit the supervisory industry division to translate them into material requirements.

In the case of some components, like bolts and nuts, the supervisory industry division can make a better estimate from past usage and general trends than by collecting information through claimant agencies, who would have to collect it in turn from all their prime consumers. In the case of B-2 end-products claimant agencies can supply industry divisions with an accurate estimate of their requirements from their production or procurement programs. It is therefore unnecessary for B-2 products to be reported on Form CMP-3.

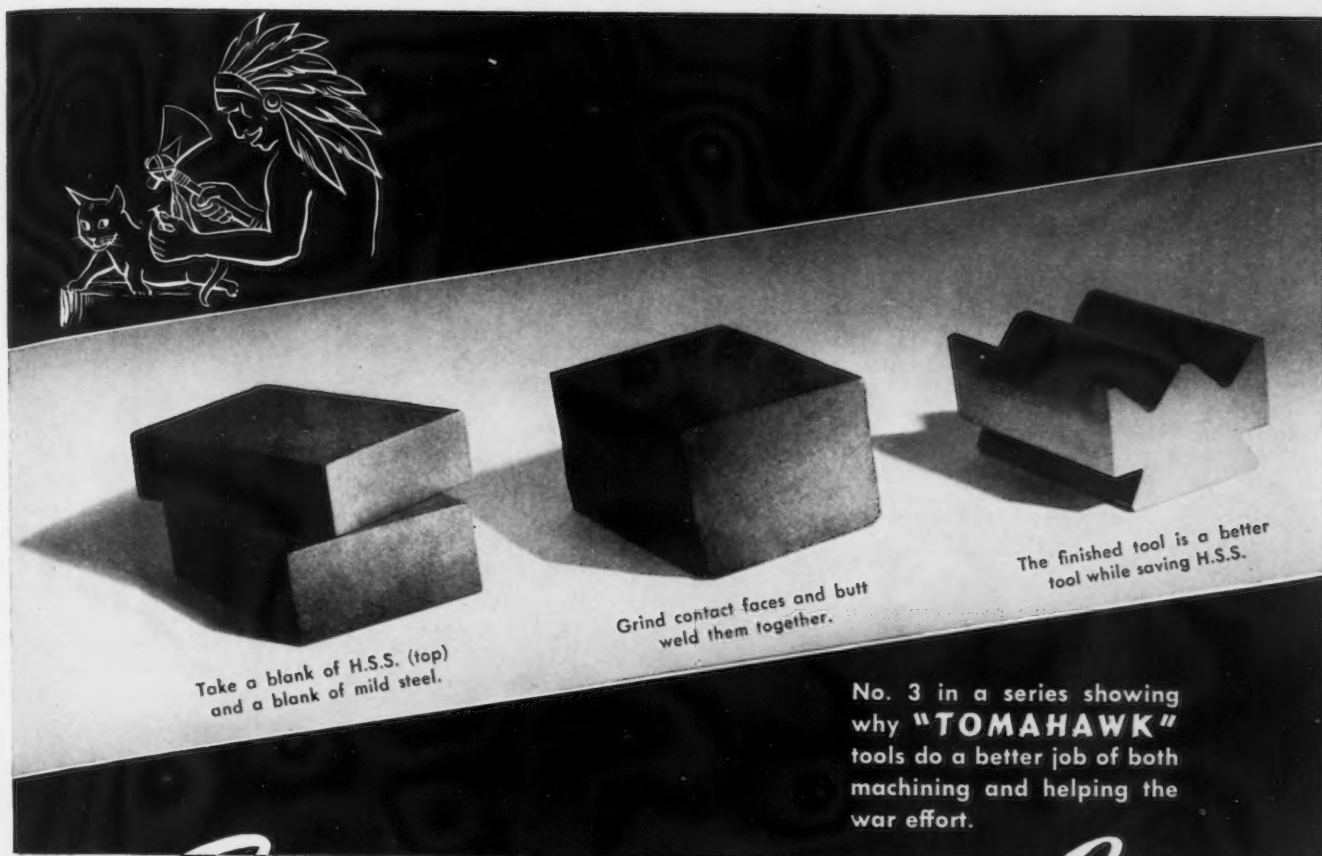


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YOUR production parts finished by the new Ultra-Lap machine method, to an optically flat surface . . . to specifications for flatness of one light band or less . . . to a smoothness as low as one micro-inch R.M.S. . . . any metal or material, or any combination thereof . . . much faster, more uniform than hand methods.

Machine designed for you or we shall be pleased to lap your parts on a job basis. Ultra-Lap machines and service used by aircraft and many other war-time industries.

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Putting skin on a Cator on a Tool.....

Just as there is more than one way to skin a cat, so there is more than one way to save critical tungsten and still make better tools.

There is a total of less than 2 per cent of critical tungsten in the complete **TOMAHAWK** tool type* shown at the right. The reason: it has been fabricated by electrically welding High Speed Steel to mild steel, prior to machining, heat-treating, and grinding. The net saving of tungsten usually runs 50 to 75% as compared with tools of solid H. S. S.

The **TOMAHAWK** tool shown is 'hard' where hardness is required (at the cutting edges), and is 'tough' where toughness is important (at the dovetail).

Perfection of welding and heat-treating techniques have been carried to such a point today that failures of such tools at the weld are virtually unknown. Thousands of electrically welded composite steel **TOMAHAWK** tools are now in use in war production industries.

*Genesee produces a complete line of cutting tools, including H.S.S., carbides, etc.
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GENESEE TOOL COMPANY
F E N T O N , M I C H I G A N



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Priorities Named on Non-CMP Repair and Operating Supplies

• • • The overlap between priorities and CMP is becoming more noticeable with the issuance of CMP regulations which specifically outline the part preference ratings will play in controlling non-CMP materials.

The latest information concerning Regulation No. 5 which has not yet been issued, indicates that preference ratings will still be used for distribu-

tion of non-controlled materials for repair, maintenance and operating supplies, according to reports on the regulation. Industries will be divided into three groups under the CMP regulation according to their importance to the war effort and each group will be assigned a priority rating.

Group I is expected to hold an AA-1 rating, Group II an AA-2X rating and

all others A-10. On purchase orders for these materials the order is required to bear the preference rating, certification of essentiality, the symbol MRO (meaning maintenance, repair, operating) and the industry identification number. Supplies for the A-10 holders will be hard to obtain but assistance may be requested on Form PD-1A filed with the proper WPB Industry Division or for amounts of less than \$500 appeal should be made to regional WPB offices.

The quantities of MRO materials you may obtain under CMP and the uses for which this material is permitted will be controlled in three ways. Most P orders now effective will be continued with slight modification although CMP preference ratings will replace old P order ratings in the event of a conflict in precedence. The regulation, when issued, will specify the industries in which P orders will remain in force.

All industries not covered by P orders now will probably be held to a dollars and cents value of their 1942 consumption of maintenance, repair and operating supplies. Adjustments will be allowed for seasonal changes in operations.

Provisions of existing E, L and M orders relating to MRO material are expected to remain in effect until revoked or modified.

Industry Divisions will have authority to increase the quotas for CMP producers whose production schedules are being impaired by a lack of MRO supplies.

Tin Restricted in Meters

Washington

• • • More than 250,000 lb. of tin, it is estimated will be saved by the restriction on the use of tin in repairing gas meters, contained in order M-43-B issued on Jan. 26 by WPB. The order forbids the use of tin in meters of less than 300 cu. ft. an hour capacity except in meters found upon testing to be inaccurate by more than plus or minus 4 per cent. Meters which have not been repaired internally for 12 years are also excepted.

Conveying Machinery Eased

Washington

• • • Restrictions on the purchase of used conveying machinery and mechanical power transmission equipment are eliminated under the terms of Order L-193 as amended by WPB

If it's made
of METAL



Superior metals are helping to make superior ships, tanks, airplanes and guns. Somewhere along the production line you will find one or more oil or gas-fired furnaces which depend upon a Spencer Turbo for their air supply.

In some plants you will find batteries of Spencers working 'round the clock — many of them that were there during the last war are still working satisfactorily today.

All sizes of Spencers are meeting the emergency — from the little 1/2 HP midget used for individual service to the 300 HP jobs used in large steel mills and foundries.

Some are single stage — others multi-stage; some are gas tight — others acid proof. Most are direct connected but some are belt driven.

But all bear the mark that has been a recognized standard of dependability and efficiency for a quarter of a century. Your furnace or oven manufacturer would probably prefer Spencer. Why not ask him?

Some of the Spencer TURBO Applications

NORMALIZING	HEAT TREATING GEARS
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HEATING BILLETS	BAKING PORCELAIN
ANNEALING	BAKING CORES AND MOLDS
SPHEROIDIZING	HEAT TREATING PARTS
	HEAT TREATING TOOL STEELS

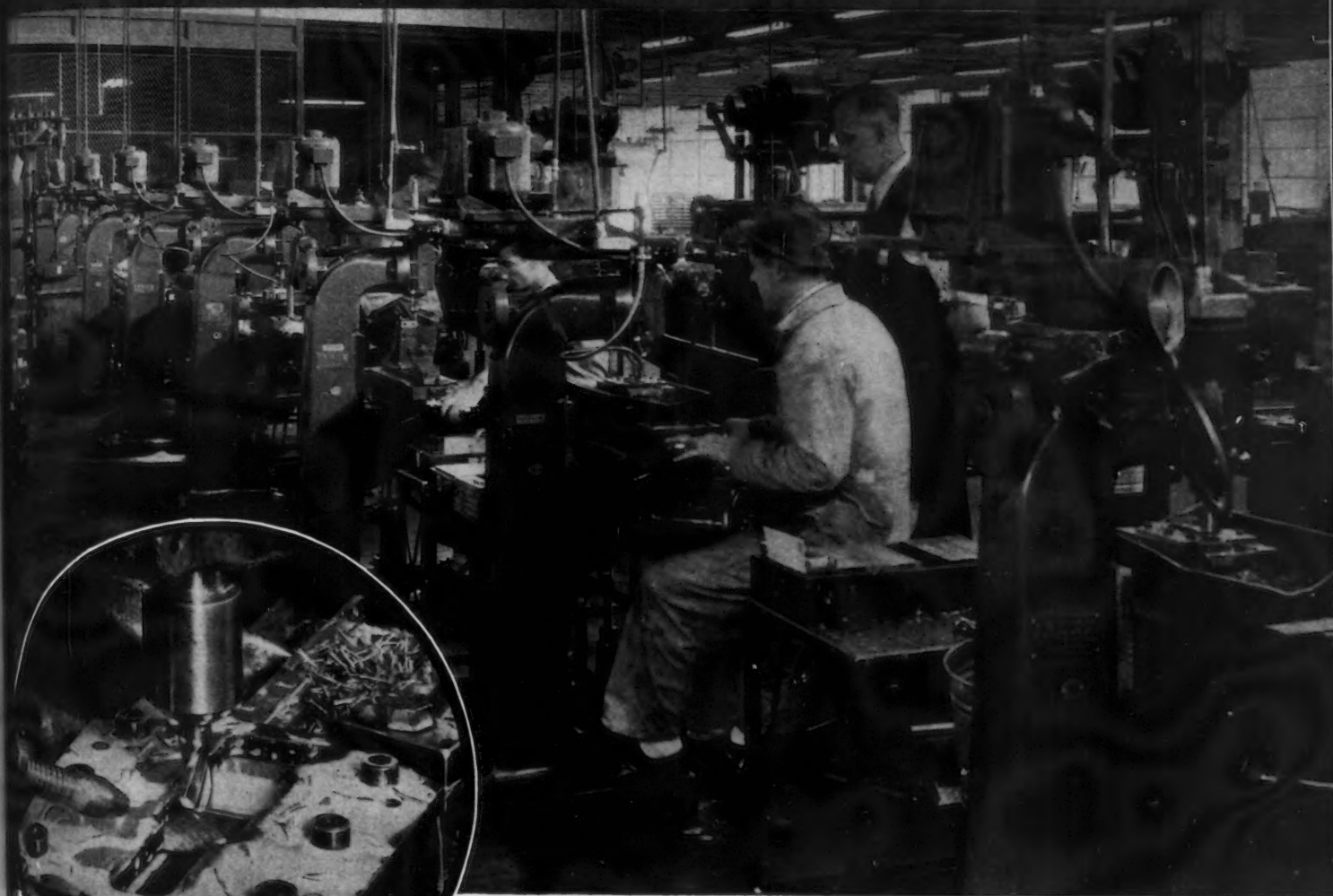
THE SPENCER TURBINE CO. • HARTFORD, CONN.

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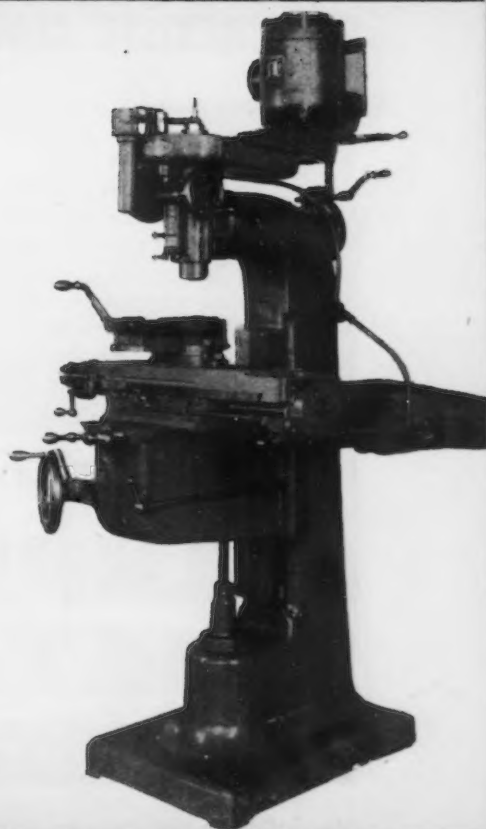
35 TO 20,000 CU. FT. 1/2 TO 30 HP. 8 OZ. TO 5 LBS.

TURBO-COMPRESSORS

"Wouldn't Trade These Index Mills for Any Type of Miller"



Picture shows part of a battery of fifteen machines on gun parts in a Detroit plant. Insert circle shows one of the parts #46-40 prehardened steel Brinnill 300, and chips incidental to the work.



When a certain general manager made a remark, he voiced the feelings of hundreds!

The general manager already had dozens of old line mills in his plant but couldn't get delivery on standard millers. He had a flock of war orders to fill out, and so he bought a battery of Index Mills.

Now he wouldn't trade them for any type of mill because of their flexibility and the unbelievable variety of work these Index Mills turn out.

Index Mills were originally designed

for tool die and experimental work. Being equipped with verniers for locating and having available speeds fast enough for small end mills and rigidity for hogging out big chips on production work three shifts a day, they are becoming the popular machine on war parts as fast as managers get to know them. A piece of tool steel 8 x 16 can be worked with end mills $\frac{1}{8}$ to $\frac{5}{8}$.

If you haven't the facts on these unusual mills, manufactured by Index Machine & Tool Company, write today to the sales and distributing agents.

Blank and Buxton

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last week. This and other provisions have been made to remove the delay in obtaining some essential power transmission equipment and to solve production problems that have arisen under the original order.

Certain replacement and repair parts are exempted from the restrictions on the use of critical materials, but non-metallic parts may not be replaced with metal parts nor may steel be used to a greater extent in replacement and repair than in the original part.

Schedules Frozen for Machine Tool Producers

Washington

• • • A 60-day "frozen" period to apply to the schedules of machine tool producers has been established under the terms of General Preference Order E-1-b as amended by WBP. During the freeze period, a manufacturer's schedules for delivery are not to be upset or modified by the receipt of higher rated orders. Such a period

was established by the original order issued April 30, 1942, and later eliminated as to orders for the aircraft program by the amendment of Nov. 5. The present order as amended thus reinstates the original "frozen" period, extending it, however, to 60 days for all types of machine tools.

Auto Parts Relaxed

• • • Production and delivery of automotive replacement parts for civilian use are given further protection under Order L-158 as amended Jan. 26 by WPB. The first change establishes the sequence of deliveries by producers of replacement parts. The amendment authorizes producers and distributors to deliver replacement parts without regard to ratings on purchase orders bearing preference ratings of AA-3 or lower. The second change invalidates purchase orders for the account of the Army or Navy or the Maritime Commission, unless they bear AA-1 or higher.

Steel Bands Restricted

Washington

• • • Iron, steel or other metal wire or band reinforcements or closures measuring 12 in. or more in length for shipping containers or fastening material into bundles were subjected to restrictions by WPB on Monday

COMMANDER: A new photograph of Admiral William F. Halsey, Commander-in-chief of the South Pacific Fleet.



Harris and Evans

AMPCO CASE HISTORIES



AMPCO METAL in Naval Ordnance RESISTS SHOCK

☆ Down in the Solomons—out on the high seas on merchantmen—in U. S. naval anti-aircraft gunmounts—Ampco bronzes for ordnance meet the critical needs of combat service.

Its rugged resistance to shock and impact, due to high compressive strength and excellent physical properties, make it desirable for use as parts in anti-aircraft gunmounts.

In industry too—possibly in your particular field—Ampco Metal has proved its worth. For 28 years these bronzes have been supplied to varied applications in machine tools, heavy machinery and similar equipment where its great strength and unusual bearing characteristics are important.

Write on your letterhead for catalogue 22, describing this remarkable bronze.

AMPCO METAL, INC.

DEPARTMENT IA-2

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THE METAL WITHOUT AN EQUAL

The
ABRASIVE
No. 1½
Hand Feed
Surface Grinder
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The Abrasive No. 1½ grinds accurately, gives a fine finish, and is recommended for the finest types of flat, form, and gage grinding. It is a hand feed grinder designed to handle the large number of jobs which consist of one piece only and for which no mechanic will bother to adjust automatic feeds and stops. It has an unusual capacity, handling work 15" long x 10" wide x 12" high.

FEATURES

Built-in motor, an integral part of head; hand

feeds, eliminate many moving parts; hand wheels of good size, conveniently located; vertical adjustment rapid and sensitive; wearing surfaces easily lubricated.

The No. 1½ Grinder illustrated; and the Abrasive fully automatic grinders—No. 3B with horizontal spindle and No. 34 with vertical spindle—are described in Sweet's Catalog, or in more detail in separate bulletins available from any dealer listed below.

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through the issuance of Order M-261. Under the order, no person may use commercially any metal strapping for containers or bundles unless:

Weight of containers and contents exceed 90 lb.; net weight of contents exceeds 100 lb. per cubic foot; use is required by regulations or orders of the Interstate Commerce Commission; container and contents are to be delivered to the Armed Forces, Maritime Commission or War Shipping Administration and are required by such agencies.

More Farm Machine Parts

••• The quota on repair parts for farm machinery was raised last week by WPB from 130 per cent to 160 per cent of the average annual net sales of such parts in 1940 and 1941. The upward revision was made by an amendment to L-170.

Limits Molding Machines

••• In order to make certain that plastics molding machinery is made available for the most essential purposes without excessive manufacture of new machines, such machinery was placed under allocation by WPB through issuance of Allocation Order L-159.

This order provides that no one may deliver or accept plastics molding machinery except as specifically authorized by WPB, nor may anyone manufacture or assemble such machinery except on orders previously authorized for delivery.

CMP Soon to Clarify Purchasing Supplies

Washington

••• The CMP regulation on maintenance, repair and operating supplies to be issued soon by WPB will provide that steel companies will not have to make individual applications for permission to purchase materials for these purposes. In general, "P" orders will remain in effect and purchasing procedure will remain unchanged. But, after a period of time mills will be required to report the purchases to the WPB Steel Division.

WPB Mails 30,000 CMP Inventory Report Forms

Washington

••• WPB announced last Saturday that it had mailed more than 30,000 CMP-7's (inventory report forms) to PRP units. The form calls for a report of shipments during the last quarter of 1942 of inventories of aluminum, copper, steel and other materials, on the CMP list, on hand Dec. 31. In addition, the schedule requires the showing of an estimate of usable inventory expected to be in the possession of the manufacturer on March 31, as well as non-usable.

Critical materials in the quantities shown in the following list need not be reported: **USABLE**—carbon steel (including wrought iron) 75 tons; alloy steel, 15 tons; copper, nickel,

tin, mica and specified critical metals (one category), 10 tons.

NON-USABLE—carbon steel, five tons, alloy steel, one ton; aluminum copper, nickel, etc., 500 lb.

If a manufacturer's inventory of the listed materials on Dec. 31 was less in all categories than the minimum amounts which must be reported, he should file the return, stating the case, but is not required to fill in the inventory and shipment schedule.

Instrument Makers Aided

••• Producers of industrial instruments used in radio manufacture will receive the assistance of the WPB Radio Division in the scheduling of deliveries, WPB said last Friday. However, manufacturers must advise the Division of the particular production programs which cover the orders on their books to get this assistance. The subcontractor, it was said, should inquire of his customers as to what their programs are and then inform the Instruments Section of the Division by letter or otherwise.

L-217 Limits Crushers

••• Drastic reductions in the number of sizes and types of portable jaw crushers and portable roll crushers are imposed by Schedule II of Limitation Order L-217, issued Jan. 30 by WPB. A producer may manufacture or assemble only one size of either the lever (Blake) type or of the overhead eccentric portable jaw crusher in each of nine groups, established according to size range. Manufacture or assembly of portable roll crushers is restricted to five specified sizes. Provisions covering manufacture are effective February 1; those covering assembly are effective March 1, 1943. Maintenance and repair parts are exempted and may be manufactured and sold for all sizes to meet the demand for maintenance of existing equipment. No person who is not currently manufacturing portable jaw crushers or roll crushers in a size listed in the schedule may begin their manufacture.

WPB Eases Oil Materials

••• Acting upon the recommendation of PAW, WPB has assigned preference ratings of AA-1 for materials to be delivered under P-98-b to petroleum industry operators for use in maintenance and repair operations or for use in alterations. Previously these materials were assigned a rating of AA-2X or lower.

PRIZE WINNER AT AIR DINNER: Igor Sikorsky (right), noted airplane designer, chats with J. C. Hunsaker, chairman of the National Advisory Committee for Aeronautics at the recent Institute of Aeronautical Sciences Dinner. At this dinner Dr. Hunsaker presented Sikorsky with the Sylvanus Albert Reed Award for the creation of a helicopter of "superior controllability."

Press Association, Inc.



This Week's Priorities and Prices

Basic pig iron to be produced at Provo, Utah, will be sold at a base price of \$21.50 per gross ton, under Amendment No. 4 to Revised Price Schedule No. 10, effective Feb. 1. (OPA-T-522)

Platinum metals have been placed under a dollar and cents ceiling at levels existing during the first quarter of 1942 in Maximum Price Regulation No. 309, effective Feb. 1. (OPA-T-523)

Cast iron boilers may be manufactured for war housing and civilian replacement needs under amended order L-187. (WPB-T-1661)

Stove manufacturers have been granted unrestricted use of iron and steel in the manufacture of coal and wood burning heating stoves during February and March under Order L-23-d as amended Jan. 30. (WPB-2426)

Magnesium metal ingot and primary magnesium alloy base prices were reduced 2c. a lb. by Maximum Price Regulation No. 314, effective Feb. 1. (OPA-T-547)

Maximum prices for four new ranges of brass and bronze alloy ingot are established in Amendment No. 2 to Maximum Price Regulation No. 202, effective Feb. 1. (OPA-T-539)

■ ■ ■

For copies of above announcements address Office of War Information, Washington, giving announcement number as shown in parentheses after each paragraph. (For example, WPB-600 means announcement 600 issued by the War Production Board.)

Revisions to The Iron Age Priorities Guide

• • • The following data, together with all intermediate weekly revisions in THE IRON AGE, should be added to THE IRON AGE Priorities Guide published with the issue of October 8 to bring the Guide up to date.

"Priority Regulations":

No. 11...Amendment establishes interim priorities procedure for transition from PRP to CMP operations (1-30-43).

"M" Orders:

M-43-b...Order bans use of tin in repairing certain gas meters (1-26-43).

M-261...Order limits metal strapping on containers or bundles to certain kinds of commercial uses (1-25-43).

"P" Orders:

P-89...Amended order grants higher priority ratings to producers of chemicals for purchase of maintenance, repair and operating supplies (1-30-43).

"E" Orders:

E-1-b...Amended order freezes machine tool schedules (1-27-43).

"L" Orders:

L-23-d...Amended order permits unrestricted use of iron and steel in the manufacture of coal and wood burning heating stoves during February and March (1-29-43).

L-30-d...Amended order limits production of hand clothes wringers (1-26-43).

L-42...Amendment to Schedule V-a eases restrictions on plumbing fixtures (1-25-43).

L-78...Amended order restricts use of metal in fluorescent lighting fixtures (1-27-43).

L-89...Amended order places closer control over the manufacture of elevators and elevator parts, equipment or accessories (1-29-43).

L-158...Amended order gives further protection to production and delivery of automotive replacement parts for civilian use (1-26-43).

L-159...Order places plastics molding machinery under allocation control (1-29-43).

L-170...Amended order raises quotas for production of repair parts for farm machinery (1-27-43).

L-187...Amended order relaxes restrictions on cast iron boilers (1-27-43).

L-193...Amended order eliminates restrictions on purchase of used conveying machinery and mechanical power transmission equipment (1-27-43).

L-199...Interpretation No. 1 (1-27-43) points out that installation of certain metal tanks is permitted if heaters were assembled before Dec. 19.

L-217...Order reduces size and type of portable jaw crushers and roll crushers to be produced (1-30-43).

BEW Clarifies CMP Allotments for Export

Washington

• • • BEW has just issued Bulletin No. 70 announcing the establishment of machinery for handling of allotments under CMP for exporters of Class A end products. Persons holding or expecting to apply for an export license (other than WP license) covering such products on which production must begin during the second quarter of 1943 to apply immediately to BEW for copies of Form CMP-4A.

The form CMP-4A will be used for all affected Class A products regardless of the use to which they will be put in the country of destination.

The form will not be used in connection with exportation of controlled materials on the CMP list. Announcements will shortly be made regarding the method of obtaining these materials as well as Class B products.

Only the holder of an export license

or applicant for such license is obligated to file from CMP-4A with BEW.

His suppliers are secondary consumers under CMP. To properly execute CMP-4A, it will be necessary that the applicant for an export license obtain certain information from his suppliers. Form CMP-4A should be used for this purpose to

the fullest extent practicable, BEW said.

It is required that Form CMP-4A be returned to the office of Exports, completely executed by the prime consumer, not later than Feb. 16. The form must be attached to Form BEW-119 in all cases other than those covered by WP or SP.

WPB Will Simplify Accounting under CMP

Washington

• • • WPB has announced a forthcoming revision to CMP Regulation No. 1 which will substantially simplify the accounting and paper work connected with the plan. The simplification will take place in the following manner, particularly affecting those manufacturing Class A products:

(1) Allotments will be made on a quarterly basis instead of monthly as previously announced, thus saving two-thirds of the accounting.

(2) The total number of programs will be reduced to less than 100 from several times that number.

The simplification will affect the accounting methods and change the requirements for allotments but all applications must be filed according to instructions already given.

Special accounting manuals using simple credit and debit methods of recording allotments and their uses will soon be available from WPB.

Hard Chrome Plating

(CONTINUED FROM PAGE 57)

ers, bushings, form cutters, gages, jig and fixture parts, etc., by building up the bore or face. Chrome plating on the cutting edge of tools is not recommended excepting on some tools for certain operations. (For a method of chrome plating cutting edges of tools, see the article, "Tool Life Increased by Im-

proved Chromium Plating Process," in the Dec. 10, 1942, issue of THE IRON AGE). Some of the salvage is necessitated by wear on the parts and a large proportion of it is due to manufacturing errors and changes in engineering which would otherwise call for a new part. Surfaces which are worn may be plated and ground back to the original size, or larger, if necessary.

Parts which are machined under-size can be salvaged by plating, the

same as on worn parts. Or if the parts are not too much undersize, they can sometimes be plated to the correct size without requiring any additional machining—this would be where the plating would not exceed a thickness of 0.001 or 0.002 in. and limits are not too close.

It has been found that sometimes a part costing several hundred dollars may be salvaged for a relatively small amount. And quite frequently, of course, there is an involved savings of time due to the scarcity of materials, and the savings in man-hours of precision machine time is enormous. It is commonplace for the salvaged parts to turn out better when chrome plated than if chrome were not used at all.

Giving Gears...



Gear involute checking machine in Fairfield's Gear Laboratory.

... the third degree!

HERE'S where Fairfield gears are checked for accuracy and conformance to specifications. No imperfections escape the equipment nor the engineers in this department. This is just part of the extensive facilities Fairfield maintains to assure customers of getting the finest possible gears to meet the most exacting specifications. Ability to do the job the way it's promised and deliver when it's promised has made Fairfield the choice of many of the nation's leading war production manufacturers.

GEARS MADE TO ORDER

- SPUR
- HYPOID
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WORMS & WORM GEARS

FAIRFIELD

MANUFACTURING COMPANY

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Lafayette, Indiana

for FINE GEARS

WPB Approves 836-Mile Texas-Indiana Pipeline

Washington

• • • The 836-mile, 20-in. seamless oil pipeline from refineries in the Beaumont-Houston area of Texas to tank car loading terminals at Norris City, Ill., and Seymour, Ind., will require 164,405 tons of new materials and 14,750 tons of old materials, including the pipe, pumps and other accessories. The line will deliver 235,000 barrels of light petroleum products daily. WPB has approved the project, subject to final review by its Requirements Committee.

Defense Plant Corp. will be requested to finance the project, which will be built for the government by War Emergency Pipelines, Inc. This is the company that was organized by the petroleum industry to construct the 24-in. pipeline now being built from Longview, Tex., to the New York-Philadelphia refining area. The estimated cost of the new line is \$44,000,000. It is hoped to complete the line about Sept. 1.

Sixteen pumping stations equipped with a total of 44 motors and pumps capable of producing 55,000 hp. will be installed to maintain the 235,000 barrel-a-day flow between Houston and Beaumont, and Seymour.

Heacock in New WPB Post

Washington

• • • B. C. Heacock, Caterpillar Tractor Co. executive and former director of the WPB Priorities Control Division, has been appointed deputy director general for distribution, it was announced by WPB last Thursday. Mr. Heacock succeeds J. A. Krug who has become power "czar."



Okay—let's go!

Key to the critical manpower situation is simplification of field tower erection which requires only unskilled labor. Tower erection is always under supervision of permanently employed Fluor Field Superintendents, who bring to your job many years of experience and all the necessary know-how. *Thus prefabrication solves another vital problem!*

WE CAN DELIVER THIS COOLING TOWER **QUICK!**

THIS is a Fluor Atmospheric Aerator Cooling Tower. It requires no critical, hard-to-get equipment such as fans, gears and motors. It requires the fewest man-hours to build and completely eliminates the man-hours consumed in the production of unneeded auxiliary equipment. It requires the absolute minimum of critical materials. These are reasons why Fluor can deliver this kind of Cooling Tower—*quick!*

But another, equally important reason speeding delivery of Fluor Atmospheric Aerator Cooling Towers is 100% prefabrication in our plant—an *exclusive* Fluor feature. Important in peacetime, prefabrication is an even more desirable advantage in wartime. Because of it, Fluor has never once failed to deliver either ahead of schedule or on time during the Defense or War Program!

It means no delivery of raw lumber and no manufacturing operations on your premises with the attendant confusion and interference with your construction program or the normal conduct of your operations. Under Fluor prefab-

rication, the only work done on your property is actual erection accomplished in minimum time by a small crew.

Fluor Atmospheric Aerator Cooling Towers have established an enviable record for highest thermal efficiency in the service of some of America's foremost industrial organizations. They are the answer to the water cooling problems of industry today. Write for descriptive literature. *Be Sure With Fluor!*



FLUOR MANUFACTURES MECHANICAL DRAFT COOLING TOWERS

Under certain conditions Fluor can deliver Forced or Induced-type Mechanical Draft Cooling Towers. There must be a willingness on the part of customers to wait while sub-manufacturers deliver fans, gears and motors to our plant. They can be delivered only on the highest priority. That's why—for the duration—we recommend the Atmospheric type. In the meantime, Fluor continues with research and development of Mechanical Draft types to give you the advantage of many improvements when the war is over.



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ATMOSPHERIC AERATOR AND MECHANICAL DRAFT COOLING TOWERS

FLUOR

Shortage of Oxygen, Calcium Carbide Seen

Washington

••• Shortages of both oxygen and calcium carbide are anticipated during the early part of this year, members of the WPB Oxygen and Acetylene Industry Advisory Committee were told at a meeting in Washington. The oxygen shortage may be aggravated and prolonged, depending upon

the completion of new plants under construction. Members were asked to advise the Chemicals Division of places where conservation measures can be applied and consumption reduced.

A discussion of calcium carbide, the raw material used for the production of acetylene, indicated that requirements will be considerably greater than production for several months, and possibly longer if current plant

expansions and construction are further delayed. Stocks will be reduced to bare minimum shortly, making necessary drastic cuts in allocations and probably curtailment of small orders. These commodities are vital to the production of steel, synthetic rubber, many war chemicals, ships, airplanes, tanks and other implements of war, WPB pointed out.

A subcommittee was appointed to study the cylinder turn-over so that some plan may be adopted for equitable distribution to the industry of new cylinders expected to be made available some time in the spring.

Committee members were told that no more trucks are being made for industry and that the comparatively small pool probably would be exhausted before long. The industry should make known the number and types of trucks and trailers it will need. A representative of the War Manpower Commission told the members that the shortage of manpower will become increasingly serious and the industry should train men to replace those liable to the draft. Also, requests for deferment of key men should be made before reclassification. The Commission has agreed to cooperate on specific problems of this nature, he said.

Canada Establishes Used Barrel Conservation Plan

Toronto

••• A new order has been issued by S. Godfrey, Administrator of Used Goods, designed to bring into active circulation as many as possible of the used steel drums, barrels, pails and cans now scattered throughout the country.

Under the order anyone wishing to buy a used container, other than from an authorized dealer, must apply to the administrator for a special purchase permit. All steel drums must be disposed of within 30 days after removal of their contents.

Gas Shortage Hampers Plants

Buffalo

••• Because available supplies are needed for war plants, residential users of natural gas for heating have been asked by WPB to cut consumption by 25 per cent during the next ten weeks. Some plants in the affected areas, Western and Southern New York and Northern Pennsylvania, have had to stop or reduce natural gas consumption for as much as a day during the recent extremely cold spell.



**PRODUCTION LINE
METAL CLEANING
and PICKLING . . .**

***Calls for the Right
Machines, Methods,
and Materials!***

FOR STEEL SHELL CASES

ABOVE: The first cleaning machine built for the new steel shell cases—a pickling, washing, neutralizing and sulfurized tallow coating machine for 37mm shell cases prior to drawing. Capacity 3000-5000 lbs. per hour.



Write now for your copy of this new metal cleaning handbook—the first complete manual on materials, methods and machines for metal cleaning.

Effective cleaning at mass production rates is just as dependent on adapting the cleaning material and method to a particular operation as it is on the design of a special washing machine properly geared into the production line.

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OFFERS YOU ALL THREE — PLUS

- 1: A complete line of specialized metal cleaners
- 2: Years of research in the development of cleaning methods
- 3: Wide experience in designing and building special metal washing machines to meet individual requirements

PLUS: Quick service, particularly in delivery of machines. If you want to speed production and solve man-power shortages by fitting your cleaning operations into the production line, call on Magnus for the complete, coordinated service that insures quick results and better cleaning.

MAGNUS CHEMICAL COMPANY

Manufacturers of Industrial Cleaning Materials—
Washing, Drying, Pickling Equipment—Metal Drawing Lubricants
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SERVICE REPRESENTATIVES IN ALL PRINCIPAL CITIES

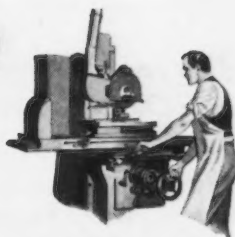
46 South Avenue

Garwood, N. J.



MAGNUS CLEANERS

To the Skeptic who hasn't yet tried the **POR-OS-WAY WHEEL**



THE MEN in the armed forces want all you can give them—NOW! You may, as hundreds of war plants have already proved, increase your precision grinding production 2 to 5 times per man per machine with the Por-os-way wheel. Try it!

A YEAR AGO we introduced to industry a new precision grinding wheel. We were confident, after three years' research and scores of actual trials on production work that this new wheel, Por-os-way, would produce 2 to 5 times more work per man per machine. And we said so. At first there were few believers. Our statement seemed incredible. But there was a war to be won. War plants by the score tried Por-os-way, probably with more hope than conviction. They did not fully realize, then, that Por-os-way, being an entirely new kind of wheel, could not be limited by comparison with wheels they had been using.

But skepticism is disappearing. Many operators now know that Por-os-way's patented honeycombed structure cools each grinding point between contacts, practically eliminating "burns" in vital war work. Many know that they can double or treble the depth of former cuts and grind in fewer passes of the wheel... have seen how the Por-os-way wheel holds its corner and resists "loading", reducing the number of dressings necessary. Many have proved to their own satisfaction that the life of a Por-os-way wheel is at least equal to or better than previous wheels, and know that Por-os-way can produce 2 to 5 times more work per man per machine. But even among Por-os-way's most enthusiastic users, some few are still not pushing Por-os-way to the limit of its possibilities. We want you to give this wheel "the whole works." We want you to see for yourself it is all others say it is. Send for "Facts about Por-os-way", with a "prescription blank" for a trial, run to your requirements.

**2 TO 5 TIMES
MORE WAR PRODUCTION
PER MAN PER MACHINE**

War plants say, "Tell others
what Por-os-way has done for us."

WAR PLANT A—Job: Surfacing oil-hardened, high-speed steel blanks on B & S grinder at 6200 SFPM.

Results: Por-os-way removed .050" in one pass, against .020" previously. Por-os-way wheel lasted 2½ times as long as former wheel, required no dressing, produced no burn, held shape and corner while grinding.

WAR PLANT B—Job: Grinding high-speed cutter tool steel on LeBlond No. 1 at 4750 R.P.M.

Results: Por-os-way increased production 300%. Held a true edge in grind-

ing a complete gear cutter. No burning, no loading. Free, cool cutting without dressing. Good finish.

WAR PLANT C—Job: Internal wet grinding on Bryant 16-A machine at 8946 R. P. M. on hardened tool steel—SAE 41/50. Precision grinding.

Results: Obtained 400% better production. Cut fast, free, and cool. Diamond dressed only occasionally to retain shape.

POR-OS-WAY*
a new
RADIAC* PRODUCT

A. P. DE SANNO & SON, INC.
NEW YORK, CHICAGO, PITTSBURGH,
CLEVELAND, DETROIT, LOS ANGELES



PHOENIXVILLE, PENNA.
Western Gateway to
VALLEY FORGE



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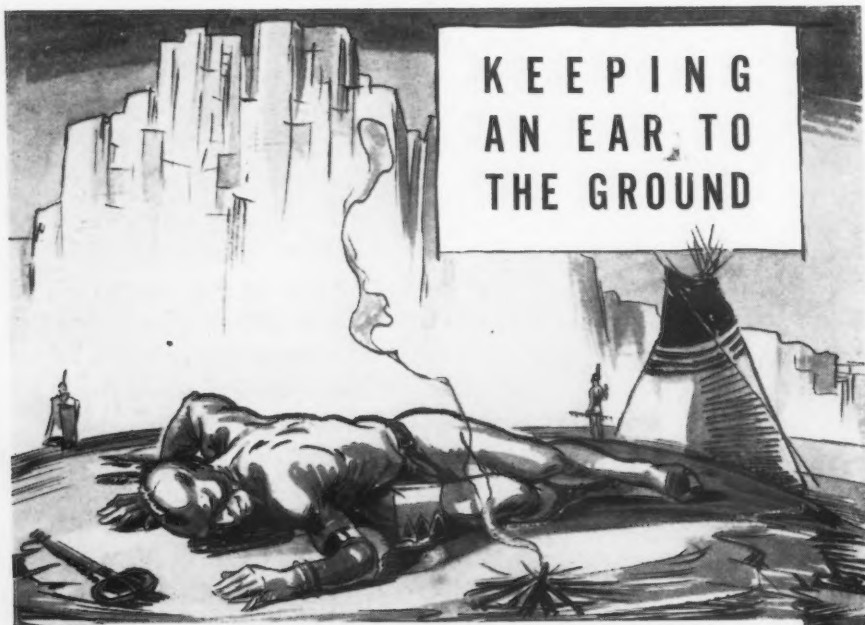
Canadian Farmers Urged To Repair Old Machinery

Toronto

• • • R. W. Gallup, administrator of farm machinery in the Wartime Prices and Trade Board, stated that in 1943 farmers will have to concentrate on what machinery they now possess, rent machinery, or work out some co-operative arrangement with their neighbors. Last year manufacturers

of farm machinery had healthy inventories to tide them over the season; this year approximately 25 per cent of the supply of machinery materials used in 1940, has been allocated.

Canadian implement manufacturers are diverting that 25 per cent allocation to absolutely essential agricultural equipment. An attempt has been made to restrict exports, but manufacturers have asserted certain export commitments must be maintained.



MODERNIZING the American Indian's custom of holding his ear to the ground to detect the approach of danger, A.A.I. Automatic Alarm Systems employ tiny robot sentries, or detectors, to serve a similar purpose in the protection of important American plants and properties from the ever-threatening dangers of sabotage, espionage and theft. Even the faintest of sound vibrations caused by any attempt to cross over, under or through industrial guard fences equipped with this modern system of alarms, are instantly converted into visible and audible signals, warning guards of danger and dispatching them to the actual zone of disturbance. A.A.I. Automatic Alarms may be installed by plant engineers, require little or no servicing and are available at a cost permitting even small factory installation. Surround your industry with this protection.

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Explanatory Literature
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116—THE IRON AGE, February 4, 1943

Lincoln Downs Charges Against Welded Ships

Cleveland

• • • J. F. Lincoln, president of the Lincoln Electric Co., described as "poppycock" the charge that lack of flexibility in welded ships caused the tanker *Schenectady*, to break up and sink following launching at the Henry J. Kaiser Shipyard in Portland, Ore. This charge was made by J. Lewis Luckenbach, president of the American Bureau of Shipping.

"There was absolutely no failure of welds in this tanker as proved by examination," Mr. Lincoln said. "However, the sinking of the vessel will produce much criticism of welding. The reason will be because welding is a relatively new method for rapid production of ships.

"There are in operation at the present time several thousand ships which are completely or partially welded, which obviously had no difficulty, since some of them had been in operation for as much as 40 years. Second, since the welded joint is much stronger than the plate and also is stronger than any riveted joint, the suspicion that the welded joint is the cause of the failure is unsound.

"Third, is the possibility that the steel was defective. This might be due to improper scrap, the high pressure of production, the lack of adequate training of green steel operators, to less cropping of the ingot with very much less inspection of the finished steel. It is entirely possible that some of the plates had bad cases of segregation which would probably be the reason for failure.

"The one thing which has been established is that the breaks did not occur in the weld. They occurred in the center of the plate."

Structural Steel Slump Shown in Final 1942 Figures

• • • December bookings of fabricated structural steel amounted to 67,600 tons, as compared to 146,379 tons for the corresponding month a year earlier, according to the American Institute of Steel Construction, New York. The yearly total of 1,762,453 tons was 23 per cent less than the 2,296,954 tons booked in 1941 and about 10 per cent more than the year 1936.

December shipments of 145,280 tons showed an increase over November. Total shipments for the year were 2,039,966 tons compared with 2,251,089 for 1941.

PEACE TERMS

are being written in "Facts-in-Figures"

RIGHT NOW




Veeder-Root
INCORPORATED
The Counting House of Industry

The length of the war and terms of the peace are being forecast *today*, in plain black-and-white, by American production machines . . . in hourly and daily facts in figures supplied by Veeder-Root Counting Devices. This accurate "current history" of production eliminates the confusion and uncertainty that cuts down speed and efficiency where no count is kept . . . prevents over-runs and shortages . . . improves interdepartmental co-ordination and timing. All of which is a solid contribution toward one end . . . *a quicker end to this war*. So if your work counts importantly in the War Effort, find out how Veeder-Root can help you make it count to the utmost.

Architect: Walter Martens,
Charleston
General Contractors: H. B.
Agston & Sons, Charleston



Modern Design
Advanced Engineering
and Carey
INSULATIONS



**MAKE UNITED CARBON'S NEW HOME
BEAUTIFUL, SUBSTANTIAL, EFFICIENT-**

United Carbon's new office building at Charleston, W. Va., is a vision of modern design, beauty and color, with advanced engineering providing convenience and comfort facilities in keeping with the impressive architecture.

To insure the utmost efficiency in heating, air conditioning, and chilled water supply, CAREY Insulations were used extensively—Careycel Pipe Covering on low-pressure steam lines . . . CAREY 85% Magnesia on high-pressure lines . . . CAREY Impervo on cold water pipe . . . also CAREY Insulation Cement, Magnesia Block and Air Cell Block in the heating and cooling systems. The air conditioning ducts were insulated with CAREY Rock Wool.

CAREY Insulations are the logical choice for modern construction where the utmost efficiency must be combined with permanence. Whatever your insulation requirements, you can make sure of maximum performance by specifying CAREY. A nationwide service organization is at your command. For details, address Dept. 26.

THE PHILIP CAREY MANUFACTURING COMPANY • Lockland, Cincinnati, Ohio

Dependable Products Since 1873

IN CANADA THE PHILIP CAREY COMPANY LTD. Office and Factory, LENNOXVILLE P. Q.

Coal Price Increase to Affect Heavy Industries

Washington

• • • Reflecting higher production costs involving the extension of the 35-hour week to six days and other operational cost increases, OPA announced an increase Jan. 30 in maximum prices for bituminous coal in District No. 2—western Pennsylvania—which will permit an average increase in mine realization of approximately 23c. a ton.

The new prices were made effective Jan. 30, to make possible the continued operation of the six-day week. The price increases will be passed on to the ultimate consumer with the major part of the increases principally affecting coal sizes used by railroads and heavy industry, OPA stated.

Pending further development in negotiations between operators and miners in Price Area No. 1 (Appalachian and Michigan districts 1 to 8) with respect to working the sixth day, OPA will adjust schedules to approximate an added realization of 8c. per ton to cover cost increases for items other than overtime labor. These increases covering higher operating costs and materials since April will be granted whether or not the mines go on a six-day week.

The overtime increase for the sixth day will amount to approximately 9 per cent of the labor cost for the present five day, 35 hour week established by contract.

2400-Hp. Mississippi Boat To Tow 90,000 Barrels of Oil

Cleveland

• • • Huck Finn and Tom Sawyer would be aghast with amazement could they stand along the banks of the Mississippi next month when the first steel towboat, the "Sohioan", goes into service. The new ship was built for the Standard Oil Co. of Ohio to tow petroleum products. The 2400-hp. diesel powered craft will be the most powerful on the river and is expected to handle 10 to 12 barges, each loaded with 9000 barrels of oil. This is equivalent to four miles of tank cars.

The towboat is of welded construction throughout, 160 ft. long, with a 38-ft. beam, and draws 6.5 ft. of water. Crude oil will be used for fuel. To maneuver the boat and her barges, which will total about 1000 ft. in length, the boat is equipped with triple screws and has six backing and three steering rudders.

Coke Consumers Pay 4c. Transportation Tax

Washington

••• Retroactive to Dec. 1, 1942, the transportation tax of 4c. per net ton provided in the 1942 Revenue Act will be paid by consumers of by-product foundry, by-product blast furnace and beehive furnace coke. An OPA ruling to this effect was contained in Amendment No. 2 to Revised Price Schedule No. 29 covering by-product foundry and by-product blast furnace coke and Amendment No. 3 to Revised Price Schedule No. 77, beehive oven furnace coke produced in Pennsylvania.

In addition, Amendment No. 1 to Supplementary Order No. 31, which covers the application of the tax on the transportation of property, was issued simultaneously to exclude Schedules No. 29 and 77 from its provisions.

The transportation tax paid on the coal used in making coke, not in any event to exceed 4c. per net ton of coke, may be passed on to the ultimate consumer, but in billing the tax must be stated separately.

Extra Charges Limited

••• All operating and maintenance service charges made by persons renting construction equipment such as supplying operating crew, fuel, lubrication and maintenance, must be submitted to OPA for approval, members of the trade were informed recently.

Under no circumstances, OPA officials stated, can a dealer or contractor charge more than the rental for the bare machine plus transportation charges provided for in MPR No. 134 unless approved by OPA.

Resellers Permitted New Extras and Maximum Prices

Washington

••• OPA on Tuesday permitted resellers of iron and steel products to pass on to the consumer the following extras:

On full finished or cold reduced finish cold rolled sheets of No. 1 U. S. S. gage and heavier, \$1 per 100 lb.; on No. 12 U. S. S. gage and No. 13 U. S. S. gage, 50c. per 100 lb.

At the same time price schedule No. 49, governing resale of iron and steel products, was amended to likewise permit resellers to apply to OPA for new maximum prices on imported steel which will allow them compensation for abnormal charges for transportation, war risk insurance, etc.

Another Way in Which the Use of Manganese Steel Saves Metal

Liner plates are one of many applications where Amsco Manganese Steel has proved definitely economical by reason of longer service life and less frequent interruptions for replacements. But the economy of manganese steel does not stop there.

In the brutally severe service to which liners, in such operations as ball mills, are subjected, resistance to both impact and abrasion is essential if the plates are to stand up long. Manganese steel work-hardens under impact and, as a result, excels in abrasion resistance; and, because of its unequalled toughness (strength plus ductility), the casting will often resist fracture even after wearing down to only a small fraction of its original thickness. As a ball mill manufacturer puts it:

"We think it a fair statement that a 1-1/2" thickness of manganese steel under normal grinding conditions will outlast a 3-1/2" thickness of white iron, giving full weight to the inherent ductility of

manganese steel as against the inherent brittleness of the originally harder metal.

"In actual service this means that the 1-1/2" manganese steel liner can be worn down to 1/2" thickness or even less before it has to be discarded. On the other hand, 3-1/2" white liners have to be discarded when worn down to 1-1/2" because of the breakage which often causes severe damage to the mill itself unless quickly discovered."

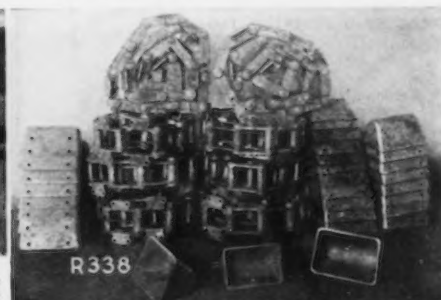
Ball mill liners are cited merely for example, since not many readers of this magazine buy or use them. But there are unquestionably many places in almost any manufacturing plant where austenitic manganese steel will solve the problems of continuous operation and fewer repairs.

And this solution will also save metal now wasted in short-lived and easily broken equipment parts.

These ball mill liners (A160) can wear thinner than other metals used for liners before it becomes necessary to discard them. Conveyor chain and buckets (R338) typical of many types of manganese steel chain used by industry.



A160



R338

Better steel requires more scrap!

Amsco
AMERICAN MANGANESE STEEL DIVISION
Chicago Heights, Illinois

FOUNDRIES AT CHICAGO HEIGHTS, ILL.; NEW CASTLE, DEL.; DENVER, COLO.; OAKLAND, CALIF.; LOS ANGELES, CALIF.; ST. LOUIS, MO.
OFFICES IN PRINCIPAL CITIES

THE AMERICAN
Brake Shoe
AND FOUNDRY COMPANY

10 YEARS AGO

This blade solved
today's metal
sawing problem



Victor Saw Works, Inc.,
advertisement on front cover
of "The Iron Age" for Dec. 10, 1932.

Ten years ago VICTOR introduced the first molybdenum alloy hack saw blade—bringing a tremendous saving in heavy duty metal sawing costs.

Today VICTOR "Moly"* High Speed—better by far in steel, heat treatment and uniformity—is being adopted by war production plants everywhere—with no impairment of cutting efficiency.

When you buy power or hand blades for high speed work, be sure to specify VICTOR "Moly"* High Speed—the original molybdenum alloy blade, unexcelled today. Look for the all-over gold metallic finish that identifies the genuine.

For awkward work, it's VICTOR Unbreakable Special Flexible—that cuts like an all hard, yet cannot be broken in use in a frame. Green metallic finish.

VICTOR SAW WORKS, INC.
MIDDLETOWN, N. Y.



*T.M. Reg.—introduced and made only by Victor Saw Works, Inc., and affiliated companies.

VICTOR MOLY HIGH SPEED

NEWS OF INDUSTRY

U. S. Furnaces Aided By Pan-American Scrap

• • • Old metal from the scrap heaps of the other Americas is flowing north to make guns and ships for the United Nations, it recently was revealed by the office of the Coordinator of Inter-American Affairs.

This old metal supplements the millions of tons of vital metals and ores—bauxite, copper, lead, zinc and others—the hemisphere is contributing to the North American war industries.

From the sugar mills of Cuba and the banana plantations of Central America, from the oil fields of Venezuela and the refineries of Aruba and Curacao, the mines of Colombia, the railroads and farms and industries of all the Americas scrap metals now flow to the United States to supply mills and furnaces producing arms.

The southern continent ordinarily imports 1,500,000 tons of steel a year. Now the republics to the south have become the United States' greatest outside source of scrap metal.

Seeking scrap wherever obtainable, the United States Board of Economic Warfare is contracting for scrap from hemisphere sources as part of its worldwide metal procurement efforts.

The contracts are made directly with commercial scrap firms. The other American governments cooperate by permitting scrap to leave the country after local requirements are met.

Also aiding in the scrap drive are the large oil companies. Most of them are donating their scrap reserves to the needs of war. Venezuela is expected to yield important tonnage in scrap material from her oil fields.

Contracts have been signed to obtain scrap in Colombia, Costa Rica, Cuba, Dominican Republic, El Salvador, Guatemala, Haiti, Honduras, Mexico, Nicaragua, Panama, Puerto Rico and Venezuela. Similar contracts are being negotiated with other American republics.

Foreign possessions in the Caribbean area are also included—Aruba, British Guiana, British Honduras, Curacao, French Guiana, Jamaica, Surinam and Trinidad.

Heavy scrap flowing to the United States includes dismantled short-line railroads, bridges, abandoned mining and oil equipment, and even wrecks and sunken ships, some of them sabotaged by enemy crews in harbors of the hemisphere. The submerged scrap includes one barge which sank with 2000 tons of railroad scrap.

The **NAME**
and the
PRODUCTS
ARE

SUPERIOR

**HOT AND COLD
ROLLED STRIP STEEL
CARBON and ALLOY
including
STAINLESS**

**SUPERIOR
STEEL CORPORATION**

CARNEGIE, PENNSYLVANIA

CMP Regulation No. 5 Will Classify Supplies

... What course you must follow in obtaining maintenance, repair and operating supplies under CMP soon will be explained in Regulation No. 5. While the official text of the regulation has not yet been announced, it behooves the potential user to watch carefully for the issuance of the order and the announcement of the classification of various industries with regard to how each will operate in obtaining such supplies.

Latest information indicates that the regulation will divide all industries into three classifications based on their essentiality to the war program. These will probably be Group I, making munitions and ordnance items including basic industry equipment, etc.; Group II, including all

More information on the distribution of non-controlled materials for maintenance, repair and operating by means of priorities and the effect of P, E, L and M orders on MRO supplies will be found on page 106.

industries which are considered essential and Group III which will include all industries not falling within the former classifications. In addition all industries will be divided into about 30 groups for identification purposes and assigned corresponding numbers.

Steel, copper and aluminum in the forms listed in Schedule I of CMP Regulation No. 1 will be generally available only for the maintenance, repair and operating needs of Group I and Group II industries, although Group III industries will be able to obtain very small quantities of copper and steel through warehouses. If eligible, you will get controlled materials simply by placing on your delivery order:

(1) A certification stating that the materials ordered are required for essential maintenance, repair or operating purposes and that the order is placed in compliance with CMP regulations.

(2) The symbol "MRO" (maintenance, repair and operating), followed by your industry identification number. An order for controlled materials which bears this endorsement must be treated by producers in exactly the same fashion as any CMP order bearing an allotment number. Under CMP, no preference rating will be required to get controlled materials either for maintenance, repair and operating supplies or for other purposes.

AIRCRAFT TUBING MAKER SOLVES TOUGH GRINDING PROBLEM

USES "SILVER STREAK" ABRASIVE BELTS TO REMOVE HARD SCALE FROM ALUMINUM ALLOYS

Gets Consistently Excellent Results Over 18-Month Period

Consistently excellent results . . . over an 18-month period . . . under the toughest sort of production conditions — no wonder this manufacturer of tubing for aircraft hydraulic and conduit lines is completely sold on "Silver Streak" abrasive belts. AP's exclusive insulating treatment makes "Silver Streak" processed belts tougher and longer-lasting . . . keeps them cool, sharp, uniform-cutting even when grinding temperatures go up to 1700° — heat that "burns the heart" out of ordinary abrasives.

Chances are you've got tough grinding problems, too. If so, why don't you try to solve them once and for all with AP coated abrasives? Remember — there are AP abrasive cloths, belts, discs, for every type of grinding and finishing. And we're always glad to send generous FREE samples. So write today . . . tell us the grinding problems you're up against. Abrasive Products, Inc., 535 Pearl Street, South Braintree, Massachusetts.

ABRASIVE PRODUCTS
SOUTH BRAintree MASSACHUSETTS
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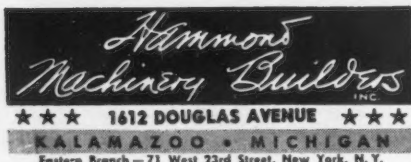
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PLATED OR BASE METALS

These Hammond High-Production 6 and 8 spindle table automatics are in use now—"helping to win the battle of production." If you have a problem in burring, brushing or polishing on plane parts, tank parts, bomb parts, shells, etc., send us samples—some in the rough — one acceptable finished piece for complete engineering report. Do it today.

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ALSO: Grinders; Abrasive Belt Surfacers;
Polishing Lathes and Cylindrical
Finishing Machines



NEWS OF INDUSTRY

WPB Programs Plan Mineral Expansions

• • • Plans to coordinate and correlate the broad programs of all governmental agencies for increasing the supply of essential minerals and metals were announced Jan. 30 by WPB Chairman Donald M. Nelson.

Formation of a Mineral Resources Coordinating Division was revealed. It is to be aided by a Mineral Resources Operating Committee and a Minerals and Metals Advisory Committee. Howard Young, St. Louis, Mo., president of the American Zinc, Lead & Smelting Co., was appointed by Ferdinand Eberstadt, program vice-chairman of WPB, to be director of the new division and to act as chairman of the two committees.

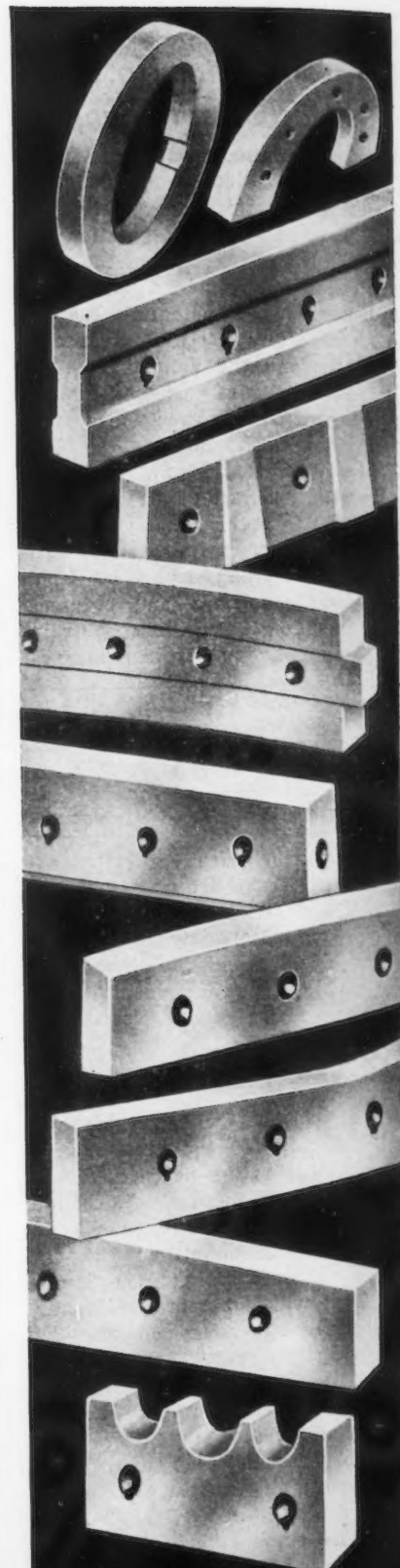
The Minerals and Metals Advisory Committee comprises representatives of all the major governmental agencies concerned with the production of ore. These include: War Department; Navy Department; Board of Economic Warfare; Reconstruction Finance Corp.; Bureau of Mines; Geological Survey; Bureau of Foreign and Domestic Commerce; Office of Civilian Supply, WPB; Office of Production Research and Development, WPB; Facilities Bureau, WPB; Labor Production Division, WPB; Stockpiling and Transportation Division, WPB.

The Mineral Resources Operating Committee will be composed of a representative to be named by the Secretary of the Interior and representative of the Board of Economic Warfare, the Reconstruction Finance Corporation and the Office of Production Research and Development, WPB, in addition to Chairman Young.

Under the new arrangement, the Mineral Resources Coordinating Division will be responsible for coordinating plans, programs and procedures within WPB and with the other governmental agencies. It will also advise the Program vice-chairman in these respects.

Chicago Asked to Test Non-ferrous Scrap Drive

• • • Plans for a test drive, to be held some time in February, for collecting copper, brass and bronze scrap from householders are being developed by Chicago municipal authorities, despite the fact scrap dealers find it very difficult to dispose of such material already in their yards. The purpose of this test drive is to enable WPB to determine quotas for other cities to meet in non-ferrous drives.



Greater Tonnage
Per Edge of Blade



AMERICAN
SHEAR KNIFE CO.
HOMESTEAD · PENNSYLVANIA

Swope Would Broaden Engineer's Postwar Training

• • • The scope of the engineer's activities in the post-war world must be broadened and the period of his training in liberal subjects lengthened. This was the thesis of the plea voiced by Gerard Swope, president of General Electric Co., on the occasion of his receiving the Hoover Medal for 1942 from the American Institute of Electrical Engineers, the American Society of Civil Engineers, and the American Institute of Mining and Metallurgical Engineers. The medal was presented in New York City, Jan. 27.

"A knowledge of the growth of industry, and especially the struggle of labor for a larger share of the fruits of production, and a recognition of labor's place in industry, should assist the engineer in taking his rightful place in society and aid him in developing policies that will insure greater good, both materially and spiritually, for the greater number," Mr. Swope declared.

"Society has a right to look to engineers, with their training in accuracy and truth, for leadership in industry, where their services are especially needed to develop assurance of employment, to further progress in simpler design and better methods of manufacturing, the attainment of lower costs resulting in lower prices to the community, and a wider distribution of the products of industry," he said.

Plant Taken Over by Army Returned After Six Months

Boston

• • • S. A. Woods Machine Co., South Boston, taken over by the government in August, 1942, because of a dispute between management and C.I.O. workers, has been handed back to the owners together with \$889,491 as compensation for rental value, value of machinery, equipment, manufactured products and personal property. The settlement does not include the S. A. Woods Co., Natick, Mass., plant, which was rented to the company by the Commonwealth of Massachusetts and hereafter will not be operated by the Woods Company.

The dispute concerned the United Electrical, Radio and Machine Workers' Union demand for the maintenance of a union and an arbitration clause. Soldiers were stationed in the plant until the Murray Co., Dallas, Texas, took over management.



A Battery of Box Type Furnaces for the Carburizing, Annealing and General Heat Treating of Small Parts.

Large or Small R-S Builds 'Em All

Whether you need a small or large furnace, R-S Engineers can design an installation to meet the exact requirements encountered in your own plant.

Operating results invariably show a marked reduction in over-all costs, the conservation of fuel and labor and an improved product. After all, operating experience is the true measure of furnace value and R-S Furnaces serve many of the leading manufacturers from coast to coast.

Write for helpful suggestions concerning your present heat-treating problems.

FURNACE DIVISION

R-S PRODUCTS CORPORATION

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R-S Furnaces of Distinction

ANNEALING • CAR HEARTH • CONTINUOUS CONVEYOR
FORGING • PLATE AND ANGLE HEATING • CONVECTION • ROTARY HEARTH
SALT BATH • METAL MELTING

★ ★ ★ **BUY WAR BONDS** ★ ★ ★



THIS NEW LEMAIRE MACHINE
will drill flanges having 3, 6
or 12 holes on any bolt circle
diameter from 5½ to 10 inches

THE UNUSUAL FLEXIBILITY of this machine recommends itself to manufacturers of crankshafts whose large volume production is divided into comparatively small runs of many different models.

The three spindles, spaced in a circle 120 degrees apart, can be moved in or out from center to any diameter from 5½ to 10 inches. Indexing of head makes possible the drilling of flanges having 3, 6, or 12 holes.

How it happened to be designed

THIS MACHINE was designed as a result of a problem that was brought to us by a prominent crankshaft manufacturer. He was drilling, reaming, and tapping on a radial drill. Because these operations were performed on a single spindle machine he felt his production was limited. The machine illustrated and described here shows how we licked the problem for him. Not only was his production stepped up considerably, but a great saving in labor hours was also achieved.

The designing and building of this machine is only one of the examples of the many diversified problems that are daily occupying our attention.

If you have any problems of production capacities of machines, let us help you work them out. We invite discussions with your engineers.

BUY WAR BONDS

For drilling and reaming, spindle head movement is controlled by hydraulic circuit which allows rapid advance, coarse feed, fine feed, and rapid return.

Tapping is accomplished by disconnecting slide from hydraulic cylinder and using star handle to feed taps into work.

Four speed transmission provides wide range of speeds for drilling and tapping.

Thus, drilling, reaming, and tapping are all possible at one setting.

A special fixture at the right can be set up for any model crankshaft.

Because of its remarkable flexibility, this machine makes an ideal compromise between a single spindle setup and one having fixed spindle drill heads requiring individual fixtures for each piece of work. On this machine, setups for short runs are easily made and production is considerably increased over single spindle operations.

Lemaire TOOL AND MFG. CO.
2661 TELEGRAPH ROAD
DEARBORN, MICHIGAN
ENGINEERS AND BUILDERS OF PRODUCTION MACHINES

Truman Committee Report

(CONTINUED FROM PAGE 129)

capacity and pig iron capacity behind them; there was also provided a huge additional tonnage of coke, ores and additional transportation to bring the ores to the blast furnaces, all essential to the completed task. Only a well organized and vigorous industry could do this job.

"The most vexing aspect of the expansion program is the futile effort and wasted material which have gone into the creation of unnecessary facilities while we are begging for other urgently needed plants."

Reverting to criticism of alleged big company domination by eight corporations, the committee said that each have an ingot capacity of approximately 3,000,000 tons or more. These companies were said to have produced approximately 80 per cent of the steel prior to the war.

"They were unable," the report says, "to prevent new companies such as Kaiser and Koppers from obtaining a substantial portion of the increase in steelmaking capacity, but they were able to see to it that those increases were made at the expense of the smaller producers of steel while big steel retained its 80 per cent proportions of the industry. Three companies alone, United States Steel, Republic and Bethlehem, received a total of \$696,128,000 or 55 per cent of the \$1,283,667,000 which the Government spent to expand the facilities of the entire industry."

The committee also indulged in the customary political needling of the dollar-a-year men from the big steel companies who, it said, directed the expansion program and "had the conviction that only the big companies could make steel."

The committee again and again applied the "whiplash" of criticism to the armed services' lack of planning. There is an excess of capacity for rolled armor plate, the committee said. "The Army sponsored a 19,000 ton plant to be operated by Carnegie-Illinois at Gary and then had to shift to other products so far as possible, it said. Much of the plant was so near completion that it was not practical to change it. There is an excess of capacity for forged armor plate.

"Despite this excess Carnegie-Illinois is operating not only its own plant at Homestead, Pa., but the Government's Naval Ordnance Plant at South Charleston, W. Va. The

committee found that some work that could and should have been done at South Charleston has been diverted to Homestead by keeping particularly skilled workers at Homestead.

"It is much harder to explain the instances where capacity falls short of requirements," said the committee. As a result of the under capacities for special alloy steels airplane construction will suffer. Heat treated steels, forgings and castings also will not be available in the required quantities. In spite of data which indicated that there was not sufficient heat treating capacity, various expansions were held up or materially curtailed. Now the shortage is again acute, and will continue to be so as the demand for aircraft steels increases. These shortages could have been avoided if the demand had been foreseen in time. To a great extent they are the result of the armed forces' reluctance to prepare itemized bills of materials to cover their production programs. In one instance coming to the attention of the committee a special alloy steel was tested after deliveries had started and fatigue tests showed a slight variance. The order was cancelled necessitating removal of large tonnages of steel from production lines and adapting the steel to the manufacture of another product."

Directive Presages Flood of Tool Orders

Cleveland

• • • The directive sent out by C. E. Wilson, Vice-Chairman of WPB, requesting all services to instruct their contractors to immediately place orders for certain critical components directly affects the machine tool industry. In a list prepared by the National Machine Tool Builders Association, the items under the classification of machine tools that are affected are noted.

The expected result of this directive is a flood of orders to cover all possible requirements for machine tools, since tools required by June 30 must be ordered by Feb. 6 and tools required for the remainder of the year must be ordered by Mar. 1. This directive is understood to effect the requirements for machine tools for completion of existing contracts only, and is expected to eliminate entirely the present priority system for machine tools, permitting the substitution of a direct allocation system.

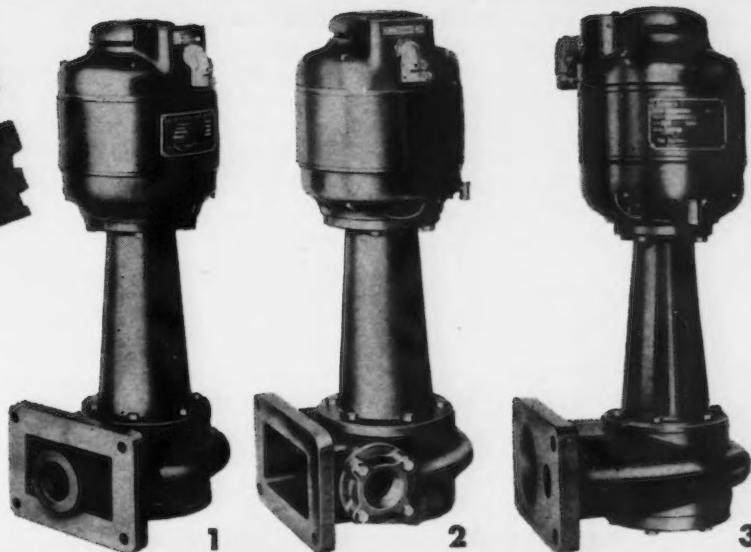
RUTHMAN

Gusher Coolant Pumps

THE OUTSTANDING COOLANT PUMP TODAY —

FLANGE MOUNTED TYPES

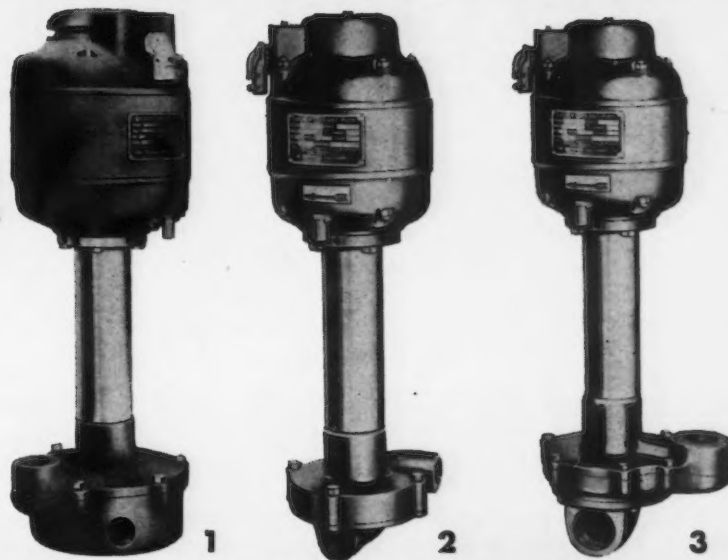
1. Internal discharge type
2. External discharge type
3. Intake and discharge through flange separately



GUSHER COOLANT PUMPS ARE MADE IN VARIOUS TYPES AND SIZES - 1/3 TO 2 H.P.

PIPE CONNECTED TYPES

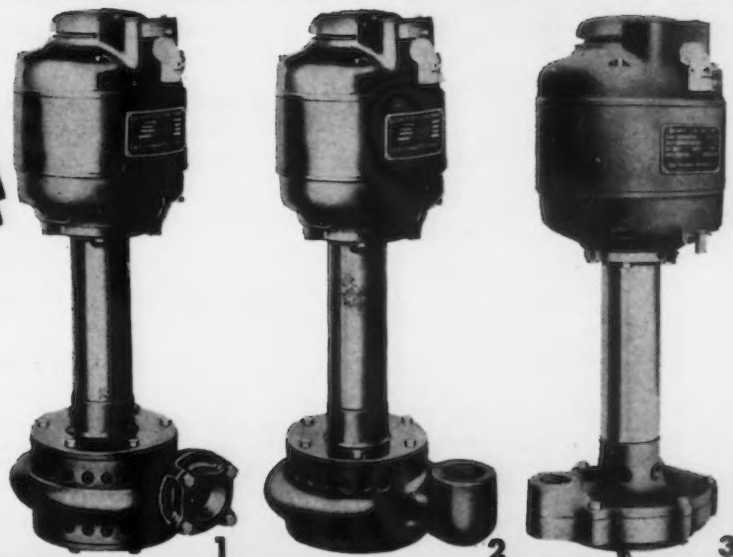
1. Side intake with vertical discharge
2. Horizontal ell intake at bottom with horizontal discharge
3. Horizontal ell intake at bottom with vertical discharge



TO MEET YOUR REQUIREMENTS — CHANGES CAN BE MADE IF BLUEPRINTS ARE FURNISHED

IMMERSED TYPES

1. Twin Intake with horizontal discharge
2. Twin Intake with vertical discharge
3. Plain Immersed type with vertical discharge



The RUTHMAN MACHINERY COMPANY • CINCINNATI, OHIO

Patent Holders May Regain Seized Titles

Washington

• • • Alien Property Custodian Leo T. Crowley recently issued a general order prescribing procedures by which certain persons whose patents or patent applications have been seized in error by the Office of Alien Property Custodian may regain title to their property.

Seizure by the Office of Alien Property Custodian of more than 50,000 patents and patent applications within less than a year inevitably involved some errors. These resulted from clerical mistakes and, in large measure, from changes affecting the inventor or the patent which are not of record at the Patent Office or which were not discovered prior to seizure.

The Custodian's General Order No. 15 is designed to correct these errors speedily and in an informal way in certain types of cases where there seems to be no question that a mistake has occurred.

Wrongful seizures resulting from

clerical errors are being corrected as soon as the facts are brought to the attention of the Office of Alien Property Custodian. Other types of clear error also are being given informal study.

General Order No. 15 prescribes two short forms by which redress may be sought in the two most numerous classes of wrongful seizure, inventors who lived in enemy countries at the time their patent application was filed or their patent granted and who since have come to the United States, and bonafide American assignees of enemy patents whose assignments were recorded in the United States Patent Office prior to Jan. 1, 1939.

Persons whose claims of wrongful seizure of patents or patent applications are not recognized informally or under General Order No. 15 may still file formal claims on Form APC-1 and obtain a hearing on the validity of their claims. The denial of a claim under General Order No. 15 does not prejudice a later claim on Form APC-1.

ODT Expands Services With Six New Field Offices

• • • The Office of Defense Transportation announced on Jan. 26 the opening of six field offices of the division of local transport. These offices will administer ODT orders and policies affecting all passenger carriers excepting steam railroads.

Addresses of the field offices as well as of the five regional offices previously opened, and the areas they serve, are as follows:

Region I—Washington, Regional Headquarters, 3330 ICC Bldg. States served are Delaware, Maryland, Virginia, West Virginia and District of Columbia.

Boston, Field Office, 185 Devonshire Street. States served are Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island and Vermont.

New York City, Field Office, 1605 News Bldg. States served are New Jersey, New York and Pennsylvania.

Region II—Atlanta, Regional Headquarters, 1210 Candler Bldg. States served are Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina and Tennessee.

Region III—Chicago, Regional Headquarters, Room 660, 209 So. Wells St. Areas served are Illinois, Metropolitan Chicago, Iowa, Michigan (Upper Peninsula), Minnesota, Wisconsin, and Metropolitan St. Louis.

Cleveland, Field Office, 1296 Union Commerce Bldg. Areas served are Kentucky, Michigan (Lower Peninsula), Ohio, Indiana (except Metropolitan Chicago).

Kansas City, Mo., Field Office, 303 Bonfile Bldg. Areas served are Colorado, Kansas, Missouri (except Metropolitan St. Louis), Nebraska, North Dakota, South Dakota and Wyoming.

Region IV—Dallas, Texas, Regional Headquarters, 402 Praetorian Bldg. States served are Arkansas, Louisiana, New Mexico, Oklahoma and Texas.

Region V—San Francisco, Regional Headquarters, 1355 Market Street. Areas served are Northern California, Nevada and Utah.

Los Angeles, Field Office, 1031 So. Broadway. Areas served are Southern California and Arizona.

Seattle, Wash., Field Office, Vance Bldg. States served are Idaho, Montana, Oregon and Washington.

Foundrymen Nominate 1943 Officers, Directors

Chicago

• • • Lee C. Wilson, general manager of Reading Steel Castings Division, American Chain & Cable Co., Reading, Pa., has been nominated for the presidency of the American Foundrymen's Association, the association's nominating committee has reported. Ralph J. Teetor, president Cadillac Malleable Iron Co., Cadillac, Mich., has been nominated to the vice-presidency.

Directors named by the nominating committee are: D. P. Forbes, president, Gunite Foundries, Inc., Rockford, Ill.; Roy M. Jacobs, president, Standard Brass Works, Milwaukee; Max Kuniansky, general manager, Lynchburg Foundry Co., Lynchburg, Va.; Harry Reiting, resident manager, U. S. Pipe & Foundry Co., Burlington, N. J.; and W. B. Wallis, president, Pittsburgh Lectromelt Furnace Co., Pittsburgh, Pa.

We'll hold it while you weld it...

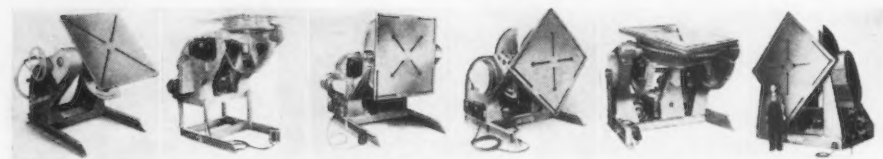


If you're doing a welding job on war production, you can get Ransome Positioners to help you increase your output and reduce costs.

With this modern equipment, your welders can readily swing the heaviest and most complicated pieces for a downhand position on every pass . . . top, sides, and bottom, with one set-up.

Made in a complete range of types and sizes . . . hand-operated and motor-operated . . . up to 20 ton capacity . . . there's a unit that will fit your needs exactly.

• Write for literature showing how Ransome Positioners can solve some of your major welding problems.



Light-duty, hand-operated

2500-lb. cap., elevating base

3000-lb. cap.

3-ton cap.

8-ton cap.

20-ton cap.

Ransome WELDING POSITIONERS

INDUSTRIAL DIVISION • RANSOME MACHINERY COMPANY • DUNELLEN, NEW JERSEY

NEWS OF INDUSTRY

WPB Sets Up Committee For Transportation Needs

Washington

••• The formation of a Transportation Requirements Committee, with William W. Judson as chairman was announced Monday by WPB. Mr. Judson is also director of the Public Services Division of the Program Bureau. He is on leave of absence from the Northern Pacific Railway, where he is general manager and is serving WPB for \$1 a year. Dr. William Y. Elliott, Director of the Stockpiling and Transportation Division, is vice-chairman of the Committee.

The committee will consider transportation requirements and priorities. A representative of each of the following agencies will serve on the Committee: ODT; War Department; Navy Department; Maritime Commission; OCS; PAW; WPB Transportation Equipment Division; WPB Stockpiling and Transportation Division; WPB Public Services Division and the WPB Automotive Division.

PAW Completes Gasoline Line to Akron

Washington

••• Jesse Jones, Secretary of Commerce, on Jan. 28 announced completion of the 82-mile 8-in. pipe line, costing approximately \$1,400,000, to carry gasoline, and extending from a point near Fostoria, Ohio, to a point near Akron, Ohio. The project, sponsored by PAW, is to be operated by the Ohio Emergency Pipeline Co., owned by the Standard Oil Co. of Ohio, Sun Oil Co. and Shell Oil Co. Construction was started in August, 1942, and the line went into complete operation at 8 a. m. Jan. 23—six months later.

Firm Records 250% Parts Production Increase

Coatesville, Pa.

••• Shipments of war materials in 1942 were 53 per cent higher than the record of the 1941 fiscal year and production has quadrupled since 1939, Robert W. Moffett, president of By-Products Steel Corp., a division of Lukens Steel Co., announced, Feb. 2.

By-Products, a volume producer of vital flame-cut parts for the Army's M-4 or General Sherman tanks, has increased production of tank parts per man per eight-hour shift more than 250 per cent during the past year, Mr. Moffett said.

The Continental Steel Corporation is now producing quality open-hearth steel sheets and wire for war needs. When peacetime comes again, Continental will be better equipped than ever to fill your needs and offer the individual and specialized service which Continental customers have known for so many years.

CONTINENTAL STEEL CORP., Kokomo, Indiana
PLANTS AT CANTON, KOKOMO, INDIANAPOLIS

CONTINENTAL SUPERIOR STEEL



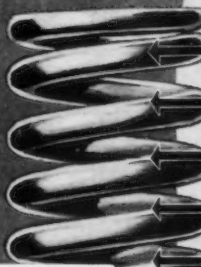
CONTINENTAL

STEEL CORPORATION

PRODUCERS OF—SHEETS: Black, Galvanized, Copper, Hot and Cold Rolled, Special Coated, Long Tens, etc.
WIRE: Bright Basic, Annealed, KONIK, Coppered, Tinned, Special Manufacturer's, etc.

Springs are not metal alone—

only in actual performance is the background of spring manufacture revealed



- RESEARCH AND EXPERIENCE
- COMPETENT ENGINEERING
- LABORATORY Controlled Materials
- SCIENTIFIC PRODUCTION Methods
- MODERN FACILITIES
- PROPER HEAT TREATMENT
- VIGILANT INSPECTION



The Treasury Bull's-eye Flag awarded B-G-R Springmakers for purchase of War Savings Bonds

B-G-R Springs, Wire Forms, and Small Stampings are built to function accurately and safely, when the going is tough. Play safe by specifying B-G-R Springs

B-G-R Springs · Wire Forms · Small Stampings

BARNES·GIBSON·RAYMOND

DIVISION OF ASSOCIATED SPRING CORPORATION
TWO PLANTS FOR SPRING SERVICE
DETROIT and ANN ARBOR MICHIGAN

OUR PRODUCTS SERVE
OUR COUNTRY—ON LAND,
AT SEA, AND IN THE AIR

... Truman Committee Report Expects

Washington

••• Containing both praise and criticism for industry's and government's efforts to meet the war steel requirements, the Truman Senate Committee's interim report just made public concludes with some reservation that there will be enough steel to win the war, but never enough for all possible uses. The report says:

"The present prospects for overall ingot tonnage may . . . be viewed without undue alarm although not with complacency. . . There is every reason to believe that there will be substantial amounts of steel for military purposes. . . Today it appears that we will barely produce sufficient steel in 1943 and thereafter to satisfy the major war necessities."

Not all of the two years' backlog of essential civilian needs can be met, the report continues, and indicates that the committee believes that ingot shortage is inescapably chronic so far as meeting all steel demand is concerned. The report sums up as follows:

"The shortages of raw materials and manpower in this country are such that we cannot expect to end the steel problem by simply increasing steelmaking capacity until it is sufficient to provide for all possible uses. We must instead determine the amount of the various kinds of steel which we will need to win the war and then proceed to increase steel-making capacity to that amount. Consequently throughout the war we must expect to have less steel than we could profitably use and we must make sure that the steel we have is allocated and used efficiently and skillfully."

Alloy and hardened steel supply will continue to be a problem in 1943, the committee expects. Lack of casting and plate producing facilities, it is predicted, will make 1943 deficits in these products. It is declared that future steel distribution will be improved by CMP, if effectively administered.

WPB Steel Division's production directives, the report says, have helped to eliminate previously existing inefficiencies, "although the priorities system is still impeding efforts to control the production of steel."

The committee expects that expanded production of 97,115,000 net tons of steel will not be reached in 1943 because 7,000,000 tons will be in construction this year. The report says that capacity will be only about 94,666,000 tons for this reason and that production will fall below rated capacity based on past performance.

The report alleges that it is doubtful that production will measure up to forecasts made by WPB because home scrap generation will, on the basis of experience, fall below 27,192,000 tons (the tonnage estimated to be necessary to support a 94,666,000-ton output). Home scrap is estimated at 20 to 25 per cent of total ingot production, according to past operations. The 27,192,000-ton figure represents 28 per cent of the 1943 rated capacity, and therefore the committee points out, there will be a possible 3 to 8 per cent loss in production on this account.

The committee asserts that the 28 per cent figure is based on the expectancy that quality steel will be used in greater quantities in the future, and claims that these steels yield a larger amount of scrap than the common grades of steel. Because of export of semi-finished steel to Lend-Lease customers, scrap supply is expected to be further diminished, the report said.

Lump ores in the amount of 8,911,000 tons required for open hearths under the program may not be available, the committee says. One alternative is declared to be extensive sintering of domestic ores, but it is claimed that this cannot be done to the extent necessary. Another alternative, suggested by the WPB Steel Division, is to get high-grade ore by draining Steep Rock Lake, Canada. This ore could be fed directly to the open hearths, but will not be available in 1943. Also, the committee says there is doubt, and certainly no guarantee, that the 14,386,000 tons of purchased scrap needed by the program will be furnished.

The fuel oil, gasoline, farm machinery shortages and housing and railroad problems could be relieved if sufficient steel were available, according to the committee. Likewise, the report states that the 100 octane gas,

synthetic rubber, shipping and the aircraft programs have suffered for the lack of steel.

But a bouquet is thrown to the industry when the report estimates that the industry will produce more than 90,000,000 tons of steel this year, an "unprecedented amount"—"within 3,000,000 tons of equaling the total steel production of the rest of the world."

Recommendations made by the report are:

It is too late to talk of readjusting the basic steel program. However, it is not too late to attempt to utilize what we have in order to get the most out of it, and to provide much needed special facilities.

Specifications must be re-examined with a view to elimination of too exacting requirements. Sizes and grades should also be standardized. The NE steels should be used much more extensively. Centrifugal and pressure castings should be substituted for many types of forgings. Much more open hearth steel should be made.

Mills should be required to limit their output to those items for which they are best suited, each mill specializing in some items. They should discontinue making a range of items requiring loss of tonnage due to change overs.

The scrap steel picture must be given careful attention and the utilization of alloy steel turnings in particular is the most pressing problem. Ultimate control over the collection of scrap steel should be placed in the Steel Division, with the power in that division to issue directives to the Salvage Division. The Steel Division should also be in a position to insist that OPA fix scrap prices high enough to induce the scrap dealer to go out and get it. Representatives of both labor and small mills should be given more voice on WPB Steel Division's committees.

Raw materials and fabricating facilities programs should be balanced. Further steps should be taken to develop new ore deposits in the country. It may be wise, after the war to preserve our best ore deposits for some future emergency period when steel will be needed in quantities obtainable only by stripping a range like Mesaba of its best ores.

"Barely Enough Steel" For War in '43 . . .

WPB should have a willingness to originate and sponsor experimental projects. Production of synthetic scrap should be stimulated. Bessemer converter-electric furnace scrap practice, duplexing, were endorsed. New scrap sources must be diligently sought. The government should utilize its employees to seek out new sources of scrap steel, rather than to check and recheck the scrap dealers. Scrap segregation orders should be enforced to alleviate alloy turnings problem—to recover alloying metals. The entire steel scrap collection program should be revamped.

OPA should adjust prices to equalize profits or to make the more important products the most profitable. (Low alloy steels sell at prices higher than high alloy steel with a resultant waste of the alloying elements in cases where carbon or low alloy steels would be satisfactory: the various ferro-alloy prices result in a tendency to produce the most profitable products rather than those which help in conservation.)

Tinplate production should be scheduled in advance, with order spacing to avoid peaks and depressions, thus enabling the mills to utilize their plant and personnel uniformly over a long period of time and to release those workers whom it otherwise tries to save to handle a rush of work.

Mistakes made under the old priorities system should not be repeated. It is essential that every ton of steel produced by every mill be specifically allocated to the most important work at hand. It is essential that so far as possible this allocation be carried back as far as the ingot so that the quantities of each type produced can be adjusted to the facilities for finishing the most urgently needed products. Allocation will require primarily that the armed forces determine their needs and state them correctly, conservatively, and in sufficient time to permit proper planning. It should greatly lessen the all too prevalent practice of asking for too much on the theory that that is the best way to assure getting at least enough.

The WPB Steel Division should check very carefully (priorities failure) accumulations of large inventories at this time when so many ur-

gent needs have not been satisfied. The armed forces and some Navy shipyards in particular have supplies on hand for many months, in some instances for eight to 10 months. Each case should be examined to determine whether, without prejudice to the war effort, the steel could be put to immediate use, and replaced by later production. Black markets should be constantly sought out and eliminated when found.

Comparing the position of the Axis with our own the committee points out that the Axis prepared for this war, built its plants and stockpiled its armaments long before hostilities commenced while this country on the other hand is hastening both to make the armaments and to build the plants at the same time.

Three major factors, the report says, delayed steel expansion and are responsible for our current steel shortage. First, it was stated, the armed forces underestimated the amount of steel they would need under war conditions. They were said now to be using as much steel in three months as they previously informed OPM they would need in a year.

The second phase of the delay was said to be the desire of the big steel companies to prevent any expansion that might react unfavorably against their control of the steel industry after the war. They feared, the report declares, both the possibility of having excess capacities of steelmaking facilities after the war and the completion of smaller companies which might gain strength during the war program. It was further said that the representatives and employees of big steel companies dominated the WPB Iron and Steel Branch. It is charged that they first failed to direct or even to allow expansion. Finally, according to the report, they concentrated practically all of the belated expansion in the hands of the eight largest companies.

The third contributing factor to the present condition, the report says, was the delay of WPB in converting industry to a war basis. Untold tons of steel were said to have been permitted to be consumed far into 1942. It was charged that the priorities system failed to accomplish its pur-

Truman Report Blank On Sponge Iron Plants

• • • The Truman Steel Report neither approves nor disapproves of the erection of sponge iron plants to provide needed synthetic scrap. However, the report says that it is not clear that any of the sponge iron processes will prove successful for large scale operation, nor any project completed before 1944 or 1945, even if successful.

WPB has chided, however, for not taking a chance by approving the expenditure of "steel and money" and permitting the erection of a sponge iron plant to utilize low grade ores for the sake of settling the "controversial question."

pose and did not stem the "huge flow of steel into non-essential commodities."

The committee said that at its hearings it found an alarming shortage of open hearth and electric furnace ingots and that in October, 1942, the shipments of all types of steel were less than half of unfilled orders covered by preference ratings requested for shipment in that month. The total orders on the books of the steel producers which carried certification that the material was for the Army, Navy and Maritime Commission were said to have amounted to more steel than the entire country could produce in that month.

The report said that the full benefits of the present expansion program cannot be felt for another six or 12 months. Poor allocation of the product on hand was held to be one of the most serious failures of the Iron and Steel Branch during most of 1942.

Turning from criticism to commendation, the report said H. G. Batcheller, who became head of the Iron and Steel Division on Sept. 21, 1942, has proven capable and able.

Speaking of expansion, the report said that despite the failings in the program, "It is only fair to mention the tremendous scope of the undertaking. Not only have facilities for finished and semi-finished products been created, and for steel ingot ca-

(CONTINUED ON PAGE 124)

PERSONALS

• **James A. Rowan**, news and markets editor, *THE IRON AGE*, has been granted a 60-day leave to handle special surveys covering production and distribution of steel and steel-making materials for the Steel Division, WPB. He is special assistant to H. G. Batcheller, division director. **Carl W. Meyers**, manager of the central alloy district, Republic Steel Corp., Massillon, Ohio, has also been appointed a special assistant to Mr. Batcheller and will serve as a member of the production directives committee and as a consultant to the chief of the plant facilities branch.

• **W. R. Talbot** has been appointed chief of the General Salvage Branch, WPB. Mr. Talbot has been acting chief since the resignation of R. K. White.

• **Robert A. Hurley**, Governor of Connecticut from 1941 to 1943, has joined the Narragansett Machine Co., Pawtucket, R. I., as vice-president and member of the board.

• **George H. Adams** has been promoted to executive vice-president of the Bunting Brass & Bronze Co., Toledo.

• **J. Wesley Cable**, research and development engineer of Induction Heating Corp., New York, has assumed the added responsibilities of general sales manager of that organization.

• **M. C. Morgan**, formerly field service engineer, has been appointed assistant Pittsburgh division sales manager of A. M. Byers Co. Mr. Morgan, who has been with A. M. Byers Co. since 1923, will be associated in his new position with H. R. Rowland, division manager.

• **Henry K. Bourne**, vice-president and director of Oglebay, Norton & Co., has retired after 50 years of service. Starting as a clerk in 1893, Mr. Bourne became a partner in the firm in 1917 and remained in this capacity until the company was incorporated in 1924, at which time he was elected vice-president and director.

• **Arthur M. Swigert**, master mechanic of Chrysler Corp., has resigned and joined the Ingles Shipbuilding Co., Pascagoula, Miss.

• **Brace H. Sibley**, an employee of Champion Spark Plug Co. for the past 20 years, has been appointed factory manager at Toledo. **B. O. Black** has been named in charge of production planning control; **J. A. Soden**, assistant to the factory manager; **John**

Nolan, production engineer, and **J. H. Beatty**, supervisor of employee relations. These promotions were announced at the time of announcement of retirement of **C. E. Dewar**, formerly vice-president in charge of production.

• **James Clarke**, for eight years a member of the accounting firm of



JAMES A. ROWAN, news and markets editor, *THE IRON AGE*, who is on leave of absence to work as special assistant to H. G. Batcheller.

Haskins & Sells, has been named assistant to comptroller at the Westinghouse Electric & Mfg. Co., East Pittsburgh.

• **Henry D. Moreland**, since 1938 X-ray division manager at Portland, Ore., has been advanced to the position of manager of the X-ray products, agency and specialties department of the Westinghouse Electric & Mfg. Co.

• **Robert S. Sloan** has been named welding specialist for the Westinghouse Electric & Mfg. Co. in the North Pacific area.

• **J. M. Zimmerman**, lawyer and electrical engineer, has been named staff manager for the Pacific Coast district, manufacturing and repair department, Westinghouse Electric & Mfg. Co. In his new post, Mr. Zimmerman will supervise repair activities, pricing and contracts throughout the district.

• **Charles R. Fay**, director of the employee accounts division of Westing-

house, has been granted a leave of absence to help develop plans and procedures which will be required to administer the new materials control plan of the WPB.

• **Charles H. Eisenhardt** has been appointed assistant manager of the electrical, wire rope and construction materials sales division of the American Steel & Wire Co., United States Steel subsidiary, succeeding **R. L. Rhodes**, resigned.

• **Charles A. Kirk**, vice-president in charge of manufacturing, and **John L. Stainton** have been elected directors of International Business Machines Corp., New York, filling vacancies caused by the deaths of **Samuel M. Hastings** and **Edward Cornell**.

• **Floyd J. Lucas** has joined the Interstate Machinery Co., Inc., Chicago.

• **Walter Moehlenpah** has joined Progressive Welder Co., Detroit, as field welding engineer covering Missouri, southern Illinois, western Indiana, southeast Kansas, southeast Nebraska and southwest Iowa.

• **A. F. Dobbrott** has been named southern district manager for Carboly Co., Inc.

• **A. W. Herrington**, chairman of the board of directors of the Marmon-Herrington Co., has been elected a director of the Army Ordnance Association.

• **Charles W. Test** has been named district sales manager of the Philadelphia District, Youngstown Sheet & Tube Co.

• **F. B. Lounsbury**, vice-president in charge of manufacturing for all plants of the Allegheny Ludlum Steel Corp. since mid-1942, will henceforth make his headquarters at the company's general offices in Brackenridge, Pa.

• **Raymond G. Rech**, for 17 years manager of the Easy Washing Machine Co., Syracuse, has been appointed assistant director of production at Bell Aircraft Corp., Buffalo.

• **T. O. Eaton** has been appointed assistant manager of sales, power transformer section, at General Electric's Pittsfield Works.

• **J. H. Allen**, formerly managing director of Olavarria Trading Corp., New York, has become associated with **L. W. Minford & Co., Inc.**, as general manager of the steel division.

• **Robert Gordon**, assistant treasurer, New York district, American Steel & Wire Co., United States Steel subsidi-

ary, has retired after 44 years of service. Mr. Gordon is succeeded by **Charles A. Johnson**, who has been credit manager in the New York district.

• **A. W. Hood**, assistant to vice-president in charge of manufacturing operations, American Bridge Company, has been presented a 50-year Gary service medal.

• **William J. Russell**, manager of engineering for the Westinghouse Electric Appliance Division, Mansfield, Ohio, has been awarded the Westinghouse order of merit, given by the company's directors to employees of outstanding ability.

• **J. M. Frank** has been elected president of the National Association of Fan Manufacturers. Other officers elected are: **J. M. Birkenstock**, vice-president, and **L. O. Monroe**, secretary-treasurer.

• **James R. Hewitt** has been appointed vice-president of American Manganese Steel Division, American Brake Shoe and Foundry Co.

• **Wilber L. Betz** has been appointed purchasing agent of the Buckeye Steel Castings Co., Columbus, Ohio.

• **R. C. Gray** has been appointed works manager of the Robins Conveying Belt Co., Passaic, N. J. **John T. Hoyt** has been named comptroller.

• **C. R. Van Gorder** has been named New York district engineer, Cardox Corp., Chicago. Prior to his New York appointment, Mr. Van Gorder was a member of the company's Chicago engineering staff.

• **Gould Grant Rheuby** has retired from his positions as vice-president, director, and member of the finance committee of Hercules Powder Co., Wilmington, Del.

• **Curtis H. Barker, Jr.**, materials handling expert of the General Electric Co.'s Bridgeport Works, has been granted a leave of absence by the company to join the Navy Department as technical consultant in its Supply Corps. He will be called upon to organize and coordinate a centralized material handling activity embracing five bureaus of the Navy.

• **Arnold W. Nelson** has been made a district representative in the Minneapolis territory for Allegheny Ludlum Steel Corp.

• **E. G. Hartmann** has been promoted to assistant general manager of sales of John A. Roebling's Sons Co., Trenton, N. J. **Douglas W. Vernon**, previously chief of the priorities division of

the John A. Roebling's Sons, has been made assistant to the general manager of sales.

• **E. E. Haubegger**, assistant district manager since 1940, has been named district sales manager for Republic Steel Corp. in Houston. Mr. Haubegger succeeds Gordon F. Hess, who was recently named district sales manager for Republic in Detroit.

• **R. W. Beard**, who formerly handled planning and execution of the General Electric Federal and Marine program in the San Francisco territory, has been named assistant to the manager of the company's Lighting Division in Schenectady.

• **David Hall**, assistant to the Pacific Coast district engineering and service manager of Westinghouse Electric & Mfg. Co., has retired after almost 35 years with the company.

• **Richard E. Palmer**, formerly in the aircraft division, WPB, has been named assistant to O. L. Woodson, vice-president and general manager of the Bell Aircraft Corp., Buffalo. He will be assigned to problems concerning manufacturing processes. **William B. McBride**, active in aviation since 1924, has been appointed production manager of Bell Aircraft.

• **Peter N. Jansen**, formerly director of manufacturing, has been named general manager for the Curtiss-Wright Corp. Airplane Division, Buffalo. **J. A. Williams**, general manager at Columbus, returns to Buffalo to serve on the staff for military contracts and subcontracting and licensing. **John P. Davey**, former works manager at St. Louis and Columbus, becomes general manager in Ohio.

• **W. A. Neracher**, founder of Beaver Pipe Tools, Warren, Ohio, 43 years ago and president during this entire period, has been elected to a newly-created position as chairman of the board. **W. A. Phillis**, formerly vice-president, becomes president and general manager; **M. W. Bechtel**, executive vice-president and treasurer; **C. W. Shafer**, vice-president, manufacturing; and **E. R. Barkley**, vice-president, sales.

• **Jonas R. Moore** has been appointed to the research staff of Battelle Memorial Institute, Columbus, Ohio, and has been assigned to its division of chemical research.

• **John W. Murphy**, who has been assistant manager of sales at the Baltimore office of the Bethlehem Steel Co. since May, 1940, has been appointed acting manager of rail sales at the home office to serve in the ab-

sence, due to illness, of **H. E. Stoll**, manager of rail sales. For reasons of health **H. G. Walton**, assistant to the vice-president, has tendered his resignation.

• **A. R. Mathieson**, assistant director of industrial relations since 1942, has been made salary administration supervisor, U. S. Steel Corp. of Delaware. In addition, he will continue to serve as chairman of the pension committee and for the present will continue his activities in the administration of the corporation employee group life insurance plan.

OBITUARY . . .

• **Charles C. Swift**, president and treasurer of the Ohio Machine Tool Co., Kenton, Ohio, died on Jan. 10, aged 63 years. He was also president of the Swift Welder Co., Detroit.

• **Frank West Maglathlin**, founder of F. W. Maglathlin & Co., Kingston, Mass., died Jan. 22. He was 77 years old.

• **Frank C. Winters**, manager of the Cincinnati office of the Electric Controller & Mfg. Co., died Jan. 10. He was 39 years old.

• **John H. Smith**, aged 76 years, at one time superintendent of the Christiansen Engineering Co. foundry at Milwaukee, and later employed by the Allis-Chalmers Mfg. Co. there, died suddenly Jan. 20 at his home in Milwaukee.

• **Albert J. Hauser**, one of the founders of the Hauser Stander Tank Co., Cincinnati, died last week at St. Petersburg, Florida. He was 77 years old.

• **J. Frederick Hartlieb**, president of Continental Can Co., Inc., died recently, aged 65 years.

• **John C. Koch**, manager of Darwin & Milner, Inc., Cleveland, died Jan. 27. He was 59 years old.

• **James E. Mills**, president of the Smith & Mills Machine Tool Co. since 1913, died last week after an illness of several months. He was 63 years old.

• **W. W. Lewis**, assistant vice-president of the American Rolling Mill Co., died suddenly Jan. 31. He was 55 years old. He was employed by the Jones & Laughlin Steel Corp. as a first helper in the open hearth department when he accepted a position with Armco as assistant superintendent of the Middletown open hearth department in 1917.

MACHINE TOOLS

... Sales, Inquiries and Market News

Machine Tool Makers Main Concern Is Taxes

Cincinnati

••• With the attention of machine tool manufacturers taken up with the preparation and filing of their income tax reports, other items in the market seem to take a second place. Although accounting departments are going ahead on the 1942 Revenue Act, some uncertainty continues to be expressed as to whether or not it will be required, because

Machine tool producers' schedules have been frozen for a 60-day period. For details, see page 109.

of the steady irritation in Washington for a change in the tax laws at the present time. Opinion oscillates between belief that some pay-as-you-go law will be passed and doubts as to any possibility of change in the present tax law.

The new business situation shows relatively no change, with manufacturers indicating a modest steady flow of new business and some indication of a retarding in the cancellation of orders. In some quarters it is believed that the heavy cancellations

of a few months ago were an hysterical reaction of consumers, equal to that of their ordering hysteria of a year or more ago. Some cancelled orders have been replaced on the books.

\$1,321,718,000 Worth Of Tools Produced in 1942

Washington

••• The value of 29,300 new machine tool units produced during December (379 manufacturers) was \$131,929,000, according to a report issued last Friday by WPB's Tools Division. This is an increase of 9.1 per cent over the November production figure of \$120,871,000 and 1.4 per cent over the previous high of \$130,008,000 reached in October, 1942.

The backlog of orders shows a 7.9 per cent drop from \$941,834,000 for December to \$866,963,000 in December. The average time required to complete unfilled orders was 6½ months at the end of December as against 8 months at the end of November. The figures for the 12th month bring the total value of machine tool production for 1942 up to \$1,321,718,000; an advance of 71.3 per cent over the 1941 production of \$771,465,000.

ALL-WOMEN ASSEMBLY DEPARTMENT: In this department at the Lodge & Shipley Machine Tool Co., Cincinnati, small lathes are assembled and tested completely by women.



Engineers to Sponsor Tool Exhibit in Milwaukee

Detroit

••• As the result of demands from industry, the American Society of Tool Engineers has reversed its previous decision and has authorized the holding of a 1943 Machine and Tool Progress Exhibition in connection with the society's annual meeting to be held in Milwaukee March 25 to 27.

The exhibit will be somewhat smaller purposely than previous A.S.T.E. shows to eliminate exhibits which do not bear directly on the job of simplifying and expediting war production. A large portion of space is reserved for the government. The exhibition is scheduled to be held in the Milwaukee Auditorium where the technical sessions will also be held.

The 1943 annual meeting of the A.S.T.E., being held concurrently with the show, is a further extension of the principles on which the exhibition will be based. Six technical sessions are scheduled for Thursday, Friday and Saturday. These will be in the forms of symposia on such subjects as "Women in Machine Shops," "Increasing Tool Life," "Tool Salvage," "Machining of NE Steels," "New Production Techniques," and "Tool Engineering Horizons."

Lawrence Radermacher, president, Stokerunit Corp., and first vice-chairman of the Milwaukee Chapter, is chairman of the Milwaukee meeting committee. Adrian L. Potter, executive secretary of the A.S.T.E., is exhibit manager.

Announcement has been made by Otto Winter, president of the American Society of Tool Engineers, of plans to publish a Tool Engineering Handbook as soon as possible. The project is under the direction of the A.S.T.E. National Standards Committee, headed by E. W. Ernest, General Electric Co., Schenectady.

300,000 Steel Drums Bought

Washington

••• Defense Plants Corp. has issued purchase orders covering 300,000 55-gal., 18-gage steel drums. The action was recommended by WPB and the Petroleum Administrator for War. The drums are to be used for the transportation in freight cars of fuel oil and kerosene from the Gulf Coast to the Atlantic Seaboard.

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THE Dings High Intensity Magnetic Separator illustrated, installed at the Whiting, Indiana, plant of Federated Metals Division, is used for high capacity purification of non-ferrous turnings and borings. One of several types of Dings Separators installed, it is typical of the equipment Dings offers to speed up scrap reclamation for the war effort.

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NON-FERROUS METALS

... Market Activities and Price Trends

Communications Will Receive Less Copper

Washington

• • • Use of copper in the wire communications industry during 1943 for maintenance and operation of the domestic telephone and telegraph networks will total about 12,000 tons, it is estimated, and the industry will return to the nation's stockpile during the year approximately an equal amount of copper in the form of scrap. These estimates were made public by Leighton H. Peebles, Director

of the WPB Communications Equipment Division.

Telephone and telegraph companies used approximately 35,000 tons of copper during 1942 in their domestic operations. In 1941, they used between 90,000 and 100,000 tons.

The average annual use by the industry for the years 1926 to 1941, inclusive, was approximately 55,000 tons. In years of expansion, such as 1928, 1929 and 1930, the annual use of copper in the domestic wire communications networks was in excess of 100,000 tons. The lowest annual use during the depression period totaled about 18,000 tons.

Canadian Platinum Enough for Allies' Needs

Toronto

• • • Canada, which is the world's largest producer of platinum metals, had the biggest production year in history of the industry in 1942, according to Charles Englehard, president of Baker Platinum of Canada, Ltd., leading smelters and fabricators of the metals. He stated that the sources of supply should be adequate to meet

all probable war needs of the United Nations for metals in the platinum group, produced in Canada as a by-product of nickel-copper production in the Sudbury area of Ontario. The most important uses of platinum are in the chemical, electro-chemical and electrical fields, where its high resistance to corrosion, erosion and oxidation are essential, while the single largest use is as a catalyst in production of nitric and sulphuric acids for munitions plants.

GRAVESTONE MAKER SUBCONTRACTS: When facilities at one of General Electric's plants became overtaxed, services of a gravestone maker were enlisted to sandblast castings for an electrical apparatus. The tombstone concern is handling 10 tons of castings per week. The subcontractor extraordinary is George F. Ames Co., Inc., of Lynn, Mass.



OPA Sets Prices For Six Platinum Metals

• • • The OPA has established maximum prices for six platinum metals effective Feb. 1 for the District of Columbia and Feb. 11 for the rest of the country. The dollar and cents levels set in maximum price regulation 309 were those prevailing during the first quarter of 1942 and for metal 99.5 per cent pure are: Platinum, \$35 an oz.; palladium, \$24 an oz.; ruthenium, \$35; rhodium, \$125; iridium, \$165, and osmium, \$50. Seller's maximum prices for metals less than 99.5 per cent pure and for waste products are not to exceed the highest net price prevailing during the period Jan. 1 to March 31, 1942.

Graphic Copper Relaxed

• • • The recent prohibition on the use of copper engraving plates for printing greeting cards, business stationery, etc., has been relaxed by WPB Order M-9-c as amended Jan. 28. Each engraver is required to sell as scrap to a scrap dealer before the end of each calendar quarter, three pounds of old plates for each pound of copper products which he engraved for the purposes in question during that quarter.

Mg Price Made Uniform

• • • OPA has ordered a reduction of 2c. a lb. in the price of magnesium ingot so as to bring the prices charged by Defense Plants Corp. and Metals Reserve into line following a price reduction announced in January by Dow Chemical Co.

Non-Ferrous Prices

(Cents per lb. for early delivery)

Copper Electrolytic, Conn. Valley.....	12.00
Copper Electrolytic, New York.....	11.75
Copper, Lake	12.00
Tin, Straits, New York.....	52.00
Zinc, East St. Louis.....	8.25
Zinc, New York	8.67
Lead, St. Louis	6.35
Lead, New York	6.50

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered: virgin, 99 per cent plus, 15c.-16c. a lb.; No. 12 remelt No. 2, standard, 14.50c. a lb. NICKEL electrolytic, 35c.-36c. a lb. base refinery lots of 2 tons or more. ANTIMONY, prompt; Asiatic, nominal, New York; American, 14.50c. a lb., f.o.b. smelter. QUICKSILVER, \$197 to \$199 per 76 lb. flask, f.o.b. shipping point. BRASS INGOTS, commercial 85-5-5-5, 13.25c. a lb.

Brass Hats Keep Their Brass Buttons

••• Molded plastic buttons and insignia will replace brass buttons and insignia on the overcoats and blouses of enlisted men in the United States Army, according to a War Department announcement. The substitution is expected to save about 365,000 lb. of metal in 1943.

Soldiers will remove brass buttons from their uniforms and replace them with the plastic. The brass buttons will be turned in. Also stopped is the manufacture of distinctive insignia for separate regiments, battalions and companies.

The order does not affect the use of metal buttons for officers' blouses.

Arrival of Battle Scrap Increases Brass Supplies

••• Contrary to all expectations, the situation in brass scrap has improved. The return of some battle-field scrap, has added materially to the stocks available, although for the most part, this has been felt on the Pacific Coast.

At present, secondary ingot makers receive the far greater bulk of brass scrap, about 40,000 tons a month, while copper refineries have been cut to approximately 6000 tons. Normally ingot makers take about 10,000 tons a month compared with 12,000 tons for refineries.

Foundry Prices Reduced

••• More than 25 million dollars will be saved the government and heavy industry in 1943 through reductions in the foundry prices of 3c. a lb. for aluminum and magnesium, and 1.5c. a lb. for copper base castings. The reductions were ordered Jan. 27 by OPA in a revision of the price regulation for non-ferrous castings, effective Feb. 1. Maximum price regulation 125 also exempts from official price control foundries that do less than \$12,500 worth of business in a quarter.

Brass Alloy Regulations

Setting of maximum prices for four new ranges of brass and bronze alloy ingots; increases in the impurities limitations of two others, and simplification of the method of establishing and reporting maximum prices for special brass and bronze alloy ingots have been announced by OPA.

LEE

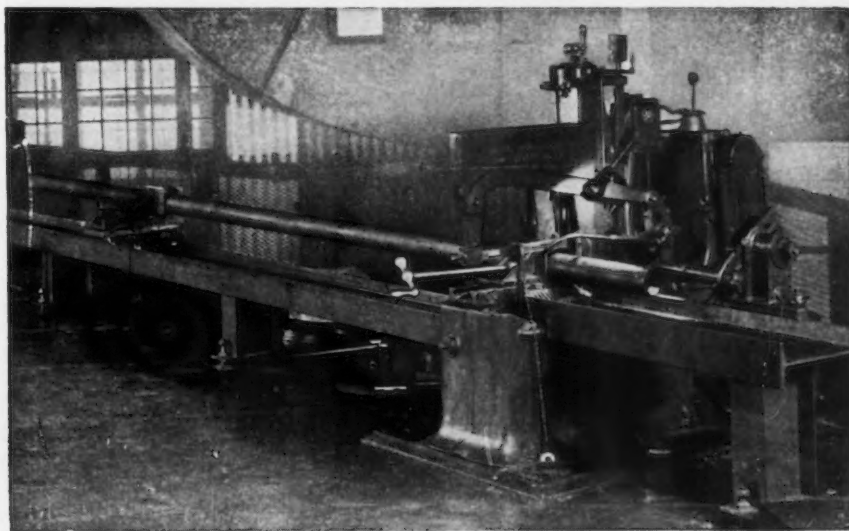
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SCRAP

... Market Activities and Quotation Trends

Prices Questioned; Stockpiling Dropped

••• The new, revised scrap prices which were altered presumably to help the trade are being severely questioned as to their worth in several parts of the country.

On the West Coast, the increased spread for processors by way of the \$1 per ton reduction in the ceiling for unprepared scrap has not won a warm welcome from either small collectors or the WPB Salvage Division. Particularly in the Pacific Northwest, where freight costs hurt basing point prices which sellers may collect, the collector's ardor is considerably damped by the \$1 reduction. Processors, however, are encouraged by the extra spread allowed for preparation.

In Boston, New York, Buffalo and many other sections, changed scrap prices are creating havoc. According to the trade, mills are not buying turnings due to the price mix-up—particularly shoveling turnings and the dealers feel that they are losing out on the \$1 premium over the old borings and turnings price and are at the same time getting stuck for the \$1 reduction on the mixed and bushy turnings. Mills are perturbed because they claim they were not consulted by OPA before making the changes. Dealers complain that they cannot put turnings in the press because of the preparation and labor costs involved. Some portions of the trade state that they believe the mills are trying to force all grades of turnings into the lowest price bracket by holding back or are attempting to build up such a backlog in dealers' yards that an OPA floor will be needed more than a ceiling.

Recent talk of stockpiling of scrap by the government in the West by means of MRC purchases has died to a whisper and the plan is considered abandoned by interests there. Originally planned to clear overburdened scrap yards there for the inflow of battlefield, demolition and other scrap, thus permitting more efficient and faster processing, the stockpiling idea met with opposition from both mills and dealers who opposed government participation. The killing blow was dealt by mills, who are reported to have bought about 300,000 tons of scrap for private stockpiling thus re-

lieving the situation to everyone's satisfaction.

The Bureau of Mines reporting last week on the scrap supply situation nationally states that stocks at consumer's, supplier's and producer's at the end of November approximated 6,742,000 gross tons representing an 8 per cent increase over October. Consumer's stocks increased by 10 per cent while producer's stocks declined only 1 per cent. The majority of the increase was traceable to an 11 per cent increase in consumer's purchased stocks while consumer's stocks of home scrap gained about 6 per cent.

Exceedingly heavy snows on the eastern Seaboard served to paralyze the processing industry and most activity is said to be confined to shoveling out. While lowered activities due to the season and the disgruntlement of operators has slowed the movement in most sections, except the far West, no immediate crisis is seen at hand. Shortage of manpower still remains a major problem in most sections and is one which does not promise any early relief.

Toledo was named last week by OPA as a basing point for No. 2 bushelings at a maximum price of \$15.35 per gross ton. Machine shop turnings were also quoted at \$13.35 Toledo; mixed borings and turnings, \$12.85; shoveling turnings, \$14.85.

Talbot Named to Head WPB General Salvage Branch

••• Appointment of W. R. Talbot as chief of the General Salvage Branch was announced last week by Paul C. Cabot, director of the WPB Salvage Division. Mr. Talbot had been acting chief since the resignation of R. K. White on Jan. 9. In May, 1942, he was made deputy chief of the General Salvage Section of the Bureau of Industrial Conservation.

WMI Gets 70-Year-Old Vault Philadelphia

••• Title to a 200-ton bank vault, 70 years old, has been given by Land Title Bank & Trust Co. to War Materials, Inc., for scrap. This is believed to be the first high cost vault removal project undertaken in the country.

Three Philadelphia Electric Co. powerhouses which are being demolished under the Regional WPB will yield about 600 tons of steel scrap.

Area Tops Million Tons In 7 Month Salvage Report Cleveland

••• Industrial salvage efforts of the regional WPB Industrial Salvage Division since its organization seven months ago has resulted in the collection of more than a million tons of iron and steel scrap and substantial quantities of other industrial materials, it was reported by J. C. Deibel, regional chief of the branch.

A breakdown of the report by materials collected is as follows:

Iron and steel scrap...	1,224,353 net tons
Non-ferrous metal scrap	65,054 " "
Rubber	5,566 " "
Miscellaneous, hemp, paper, etc.	66,446 " "
Total	1,361,419 " "

Ohio was first in the salvage program in the region, with West Virginia and Kentucky following. The report showed that more than 4000 companies, not including coal mining, petroleum, railroads, and other such industries, are operating under the WPB salvage plan.

OPA Drops Charges; Violator Pays Treasury

Detroit

••• Charges of selling steel at prices above OPA ceiling levels have been dismissed against Louis Freedman, a co-partner in the Woodmere Scrap Iron & Metal Co., after Mr. Freedman paid to the U. S. Treasury the amount allegedly received over the ceiling prices.

It was alleged that after each sale of warehouse lots of steel from the Woodmere company to the Sterling Steel Products Co. of Cleveland, Freedman would receive cash bonuses which, according to OPA, actually were payments in excess of the ceiling prices, although they were not entered on the Woodmere company books. The bonuses were said to amount to \$17,790.99 and involved sale of 4,500 tons of steel valued at \$156,000 between January and May last year.

With the acceptance of the money by the Treasury Department, OPA said the file in the matter was closed. At Cleveland OPA has obtained an injunction restraining the Sterling Co. and Mr. Freedman from violating the price regulations.

SCRAP

District Markets

BUFFALO—Short shoveling turnings were added this week to items banned by the leading consumer of scrap in the Buffalo district. Dealers pointed out that the ban came after the price of short shovelings had been boosted a dollar. With all blast furnace items and machine shop turnings included in the shipping ban, yard operators are complaining they have been left holding the bag. Some baling is being continued.

NEW YORK—Heavy snow slowed things last week. Dealers here are unhappy over the fact that mills do not seem to be taking short shoveling turnings, so that dealers feel they are losing out on the \$1 premium over the old borings and turnings price, and getting stuck for the \$1 reduction on mixed and bushy borings and turnings.

PITTSBURGH—Snow here last week caused some loss in scrap collections and probably accounts for the reason why turnings are not as easy here as they are elsewhere. They were being sold at the ceiling price early this week.

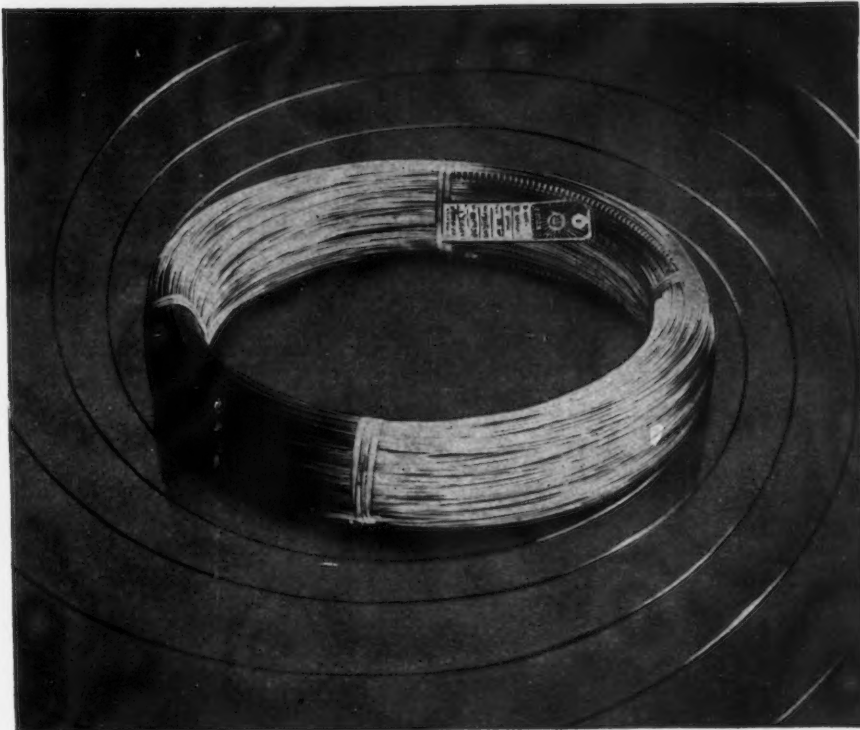
CHICAGO—Shipments into consumption in the past week showed a slight improvement but are still below levels prevailing previous to the recent cold weather. Mills are still eating into reserves, but the situation is not yet critical. Cast grades have recently been in better demand. Turnings are still a drag on the market.

PHILADELPHIA—Because of snow, scrap flow has slowed down, with the eastern mills getting less than they are using. Stockpiles are still ample. It is hinted that some mills recently have become fearful of having too large stocks of scrap at the war's end, for stripping. No short shoveling turnings are being bought, only machine shop turnings at the new lower price. A few mills have reported readiness to buy turnings.

CLEVELAND—The recent steel salesmen's scrap drive for dormant industrial scrap ended Jan. 31 but already a new campaign is being planned. The details of the new drive are being worked out and a reorganization of the committee is expected. These plans are to be ready for presentation on March 1.

ST. LOUIS—Deliveries on recent allocations to mills have been in good volume and generally there is an easier tone in the scrap situation. Dealers still complain of acute labor shortage and report current receipts include relatively little heavy melting steel. Mill inventories are holding their own.

CHICAGO—Scrap dealers on Monday requested permission to increase yard wage rates from 60c. an hour to 70c. to 75c. in a move to correct a labor shortage that has harassed yards here for some time. The request was made to the local office of the WMC through the Chicago Chapter of the Institute of Scrap Iron and Steel, according to W. Pohn, chapter president. Mr. Pohn said that scrap yards could not obtain workers because war plants are paying more.



MUSIC WIRE. Conforming to Government specifications. (WD 1085—WD 1095) Stock sizes .004" to .180" dia.

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New York Office, 114 Liberty Street

SCRAP PRICES

IRON AND STEEL (OTHER THAN RAILROAD) SCRAP

(All Prices Are Per Gross Ton)

ELECTRIC FURNACE, ACID OPEN HEARTH AND FOUNDRY GRADES

	BASIC OPEN HEARTH GRADES		BLAST FURNACE GRADES					Low Phos.		Heavy Structural and Plate			Foundry Steel				
	No. 1 & 2 Hvy. Melt. No. 1 Cp. Bk. Shrs. No. 1 & 2 Bundles No. 1 Busheling	Unbaled Machine Shop Turnings	Mixed Borings and Turnings	Cast Iron Borings	Shevelling Turnings	No. 2 Busheling	Billet, Bloem, and Forge Crops	Bar Crops, Punchings, Plate Scrap and Cast Steel	3 ft. and Under	2 ft. and Under	1 ft. and Under	2 ft. and Under	1 ft. and Under	Auto. Springs, and Crank-shafts	Alloy Free Low Phos. and Sulphur Turnings	Heavy Axle and Forge Turn. Electric First Furnace Bundles	
Pittsburgh, Brackenridge, Butler, Monessen, Midland, Johnstown, Sharon, Canton, Steubenville, Warren, Youngstown, Weirton, Cleveland, Middletown, Cincinnati, Portsmouth, Chicago, Claymont, Coatesville, Conshohocken, Harrisburg, Phoenixville, Sparrows Point, Ashland, Ky., Buffalo, N. Y., Bethlehem, Pa.; Kokomo, Ind., Duluth, Minn., Detroit, Mich., Toledo, Ohio, St. Louis, Mo., Atlanta, Ga.; Alabama City, Ala.; Birmingham, Los Angeles; Pittsburg, Cal.; San Francisco, Minnequa, Colo., Seattle, Wash.	\$20.00 19.50 18.75 19.50 19.25 18.25 18.00 17.85 17.50 17.00 16.50 14.50	\$15.00 14.50 13.75 14.50 14.25 13.25 13.00 12.85 12.50 12.00 11.50 9.50	\$15.00 14.50 13.75 14.50 14.25 13.25 13.00 12.85 12.50 12.00 11.50 9.50	\$16.00 15.50 14.75 15.50 15.25 15.25 14.00 13.85 13.50 13.00 12.50 10.50	\$17.00 16.50 15.75 16.50 16.25 15.25 15.00 14.85 14.50 14.00 13.50 11.50	\$17.50 17.00 16.25 17.00 16.75 15.75 15.50 15.35 15.00 14.50 14.00 12.00	\$25.00 24.50 23.75 24.50 24.25 23.25 23.00 22.85 22.50 22.00 21.50 19.50	\$22.50 22.00 21.25 22.00 21.75 20.75 20.50 20.35 20.00 19.50 19.00 17.00	\$21.50 21.00 20.25 21.00 20.75 19.75 19.50 19.35 19.00 18.50 18.00 16.00	\$22.00 21.50 20.75 21.50 21.25 20.25 20.00 19.85 19.50 19.00 18.50 16.50	\$22.50 22.00 21.25 22.00 21.75 20.75 20.50 20.35 20.00 19.50 19.00 17.00	\$21.50 21.00 20.25 21.00 20.75 19.75 19.50 19.35 19.00 18.50 18.00 16.00	\$22.00 21.50 20.75 21.50 21.25 20.25 20.00 19.85 19.50 19.00 18.50 16.00	\$21.00 20.50 19.75 20.50 20.25 19.25 19.00 18.85 18.50 18.00 17.50 15.00	\$18.00 17.50 16.75 17.50 17.25 16.25 16.00 15.85 15.50 15.00 14.50 12.50	\$19.50 19.00 18.25 19.00 18.75 17.75 17.50 17.35 17.00 16.50 16.00 14.00	\$21.00 20.50 19.75 20.50 20.25 19.25 19.00 18.85 18.50 18.00 17.50 15.50

*Baled turnings are \$5 per gross ton higher.

BUNDLES: Tin can bundles are \$4 below dealers' No. 2 bundles; No. 3 bundles are \$2 less than No. 1 heavy melting.

AT NEW YORK city or Brooklyn, the maximum shipping point price is \$16.33 for No. 1 heavy melting, f.o.b. cars, f.a.s. vessel or loaded on truck. Other grades carry differentials similar to those in table. New Jersey prices must be computed on basis of all-rail. At Boston the maximum is \$16.05 for No. 1 f.o.b. cars, f.a.s. vessel or loaded on trucks. Shipments from a New England shipping point to a consumer outside New England carry maximum transportation charge of \$6.65 per ton.

SWITCHING CHARGES: Deductions for shipping points within basing points (cents per gross ton) are: Pittsburgh, Brackenridge, 55c.; Midland, Johnstown, Sharon, Youngstown, Warren, Weirton, Cleveland, Toledo, Los Angeles, San Francisco, 42c.; Butler, Monessen, Canton, Steubenville, Cincinnati*, Portsmouth, Ashland, Coatesville, Harrisburg, Phoenixville, Bethlehem, Kokomo, Duluth, St. Louis, 28c.; Buffalo, Claymont, 36c.; Conshohocken, 11c.; Atlanta, Birmingham, 32c.; Pittsburg, Cal., 42c.; Middletown, 14c.; Sparrow's Point, 11c.; Chicago, 84c.; Detroit, 53c.; Alabama City, 26c.; Minnequa, 22c.; Seattle, 38c. *At Cincinnati, for basic open hearth grades, foundry steel and auto springs and crankshafts, deduct 80c. per ton.

PITTSBURGH basing point includes switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport, Cincinnati basing point includes Newport, Ky., switching district. St. Louis includes switching districts of Granite City, East St. Louis, Madison, Ill. San Francisco includes switching districts of S. San Francisco, Niles and Oakland, Cal.

MAXIMUM prices of inferior grades shall continue to bear same differential below corresponding grades as existed during the period Sept. 1, 1940, to Jan. 31, 1941. Superior grades cannot be sold at a premium without approval of OPA. Special preparation charges in excess of the above prices are banned. Whenever any electric furnace or foundry grades are purchased for open hearth or blast furnace use, prices may not exceed the prices above for the corresponding open hearth grades.

MAXIMUM SHIPPING POINT PRICE—Where shipment is by rail or vessel, or by combination of rail and vessel, the scrap is at its shipping point when placed f.o.b. railroad car or f.a.s. vessel. In such cases, the maximum shipping point prices shall be: (a) For shipping points located within a basing point, the price listed in the table above for the scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point and (b) for shipping points located outside the basing point, the price in table above at the most favorable basing point minus the lowest transportation

charge by rail or water or combination thereof. In lieu of dock charge add 75c. a ton*, but 50c. if moved by deck scow or railroad lighter. Shipping by motor vehicle: The scrap is at its shipping point when loaded. For shipping points located within basing points take price listed in table minus applicable switching charge. If located outside a basing point, the price at the most favorable basing point minus lowest established charge for transporting by common carrier. If no established transportation rate exists, the customary costs are deducted. Published dock charges prevail. If unpublished include 75c.* For exceptions see official order.

UNPREPARED SCRAP: For unprepared scrap, maximum prices shall be \$3.50 (and in the case of the material from which No. 1, No. 2, and No. 3 bundles are made \$4) less the maximum prices for the corresponding grade or grades of prepared scrap. In no case, however, shall electric furnace and foundry grades be used as the "corresponding grade or grades of prepared scrap." Converter may charge \$2.50 per ton on consumer-owned unprepared remote scrap (see order). A preparation-in-transit charge for allocated unprepared scrap is provided.

Maximum price of all scrap in a vehicle is that of the lowest price grade in the shipment. This limitation does not apply to vessel shipments if grades are segregated.

Where scrap is to undergo preparation prior to its arrival at the point of delivery, such scrap is not at its shipping point, as that phrase is defined above, until after preparation has been completed. For special preparation charges, consult official order.

CHEMICAL BORINGS: No. 1 (new, clean, containing not more than 1 per cent oil), \$1 less than No. 1 heavy melting; No. 2 (new, clean, containing not more than 1.5 per cent oil), \$2 less than No. 1 heavy melting. If loaded in box cars add 75c.

UNPREPARED CAST IRON SCRAP—Except for heavy breakable cast, unprepared scrap is given a price ceiling of \$2.50 per ton less than the maximum prices for the corresponding grade of prepared cast iron scrap. Where scrap is to undergo preparation prior to arrival at the point of delivery, such scrap is not considered at shipping point until preparation is completed.

Consumers of cast scrap may pay the shipping point price plus established charge for transporting the scrap to their plants. In the case of deliveries by truck, the cast scrap buyer must obtain from the seller a certification, made out to OPA.

*At Memphis 50c.; Great Lakes ports \$1; New England \$1.25.

RAILROAD SCRAP				CAST IRON SCRAP			
No. 1 RR Heavy Melting	Scrap Rails	Rails for Rerolling	Scrap Rails			Group A	Group B
			3 ft. and Under	2 ft. and Under	18 in. and Under		
Cleveland, Cincinnati, Ashland, Portsmouth, Middletown, Canton, Pittsburgh, Sharon, Steubenville, Wheeling, Youngstown, Chicago, Philadelphia, Sparrows Pt., Wilmington, Birmingham, Los Angeles, San Francisco	\$20.50	\$21.50	\$23.00	\$23.50	\$23.75	\$24.00	
Buffalo	18.00	19.00	20.50	21.00	21.25	21.50	
Detroit	20.25	21.25	22.75	23.25	23.50	23.75	
Duluth	18.25	19.25	21.35	21.85	22.10	22.35	
Kansas City, Mo.	19.00	20.00	21.50	22.00	22.25	22.50	
Kokomo, Ind.	17.00	18.00	19.50	20.00	20.25	20.50	
Seattle	19.25	20.25	21.75	22.25	22.50	22.75	
St. Louis	15.50	16.50	18.00	18.50	18.75	19.00	
	18.50	19.50	21.00	21.50	21.75	22.00	
No. 1 cupola cast						\$18.00	\$19.00
Clean auto cast						18.00	19.00
Unstripped motor blocks						15.50	16.50
Stove Plate						17.00	18.00
Heavy Breakable Cast						15.50	16.50
Charging Box Size Cast						17.00	18.00
Misc. Malleable						20.00	21.00
Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.							
Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.							
Group C: States not named in A and B: switching district of Kansas City, Kan., Mo.							

Simple guard for power drills improves operation



Information supplied by an Industrial Publication

Safety in small things as well as great is an excellent policy for manufacturing plants today. Adding safety devices to small power driven hand tools has the same results as the same procedure on heavier machines. Operators can work better because their attention is undivided.

That was the idea behind a guard for power driven hand drills devised by a worker in an airplane factory. He noticed that hole spotters sometimes got pinched fingers when the drill suddenly punched through the work.

The guard is very simple. It consists of a steel sleeve set into the drill chuck surrounding the shank of the drill bit. It is easy to attach, and it could be made from scrap tubing, or bar stock cutoffs with a minimum of machining.

In operation, when the drill goes through, the guard brings up against the work, and stops forward motion of the tool. It is long enough so that the operator's fingers cannot be caught between the work and the drill body. As a result slowing down caused by the operator's natural tendency to flinch is eliminated.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.
MOLYBDIC OXIDE BRIQUETTES • FERROMOLYBDENUM • "CALCIUM MOLYBDATE"

Climax Mo-lyb-d-en-um Company
500 Fifth Avenue • New York City

Comparison of Prices . . .

Advances Over Past Week in **Heavy Type**; Declines in *Italics*.

[Prices Are F.O.B. Major Basing Points]

Flat Rolled Steel: (Cents Per Lb.)	Feb. 2, 1943	Jan. 26, 1943	Jan. 4, 1943	Feb. 3, 1942
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00

Tin and Terne Plate: (Dollars Per Base Box)	Feb. 2, 1943	Jan. 26, 1943	Jan. 4, 1943	Feb. 3, 1942
Tin plate, standard cokes	\$5.00	\$5.00	\$5.00	\$5.00
Tin plate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30

Bars and Shapes: (Cents Per Lb.)	Feb. 2, 1943	Jan. 26, 1943	Jan. 4, 1943	Feb. 3, 1942
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40

Wire and Wire Products: (Cents Per Lb.)	Feb. 2, 1943	Jan. 26, 1943	Jan. 4, 1943	Feb. 3, 1942
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55

Rails: (Dollars Per Gross Ton)	Feb. 2, 1943	Jan. 26, 1943	Jan. 4, 1943	Feb. 3, 1942
Heavy rails	\$40.00	\$40.00	\$40.00	\$40.00
Light rails	40.00	40.00	40.00	40.00

Semi-Finished Steel: (Dollars Per Gross Ton)	Feb. 2, 1943	Jan. 26, 1943	Jan. 4, 1943	Feb. 3, 1942
Rerolling billets	\$34.00	\$34.00	\$34.00	\$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00

Wire Rods and Skelp: (Cents Per Lb.)	Feb. 2, 1943	Jan. 26, 1943	Jan. 4, 1943	Feb. 3, 1942
Wire rods	2.00	2.00	2.00	2.00
Skelp (grvd)	1.90	1.90	1.90	1.90

Pig Iron: (Per Gross Ton)	Feb. 2, 1943	Jan. 26, 1943	Jan. 4, 1943	Feb. 3, 1942
No. 2 fdy., Philadelphia	\$25.89	\$25.89	\$25.89	\$25.84
No. 2, Valley furnace	24.00	24.00	24.00	24.00
No. 2, Southern Cin'ti	24.68	24.68	24.68	24.06
No. 2, Birmingham	20.38	20.38	20.38	20.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	24.00
Basic, del'd eastern Pa	25.39	25.39	25.39	25.34
Basic, Valley furnace	23.50	23.50	23.50	23.50
Malleable, Chicago†	24.00	24.00	24.00	24.00
Malleable, Valley	24.00	24.00	24.00	24.00
L. S. charcoal, Chicago	31.34	31.34	31.34	31.34
Ferromanganese†	135.00	135.00	135.00	120.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
†For carlots at seaboard.

Scrap: (Per Gross Ton)	Feb. 2, 1943	Jan. 26, 1943	Jan. 4, 1943	Feb. 3, 1942
Heavy melting steel, P'gh	\$20.00	\$20.00	\$20.00	\$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.85	17.85	17.85	17.85
Low phos. plate, Youngs'n	22.50	22.50	22.50	23.00
No. 1 cast, Pittsburgh	20.00	20.00	20.00	20.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	20.00
No. 1 cast, Ch'go	20.00	20.00	20.00	20.00

Coke, Connellsville: (Per Net Ton at Oven)	Feb. 2, 1943	Jan. 26, 1943	Jan. 4, 1943	Feb. 3, 1942
Furnace coke, prompt	\$6.00	\$6.00	\$6.00	\$6.125
Foundry coke, prompt	6.875	6.875	6.875	6.875

Non-Ferrous Metals: (Cents per Lb. to Large Buyers)	Feb. 2, 1943	Jan. 26, 1943	Jan. 4, 1943	Feb. 3, 1942
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake, New York	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	5.70
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

The various basing points for finished and semi-finished steel are listed in the detailed price tables to be published in the Feb. 11 issue.

Composite Prices . . .

FINISHED STEEL		PIG IRON		SCRAP STEEL	
Feb. 2, 1943	2.30467c. a Lb.	23.61	a Gross Ton	\$19.17	a Gross Ton
One week ago	2.30467c. a Lb.	23.61	a Gross Ton	\$19.17	a Gross Ton
One month ago	2.30467c. a Lb.	23.61	a Gross Ton	\$19.17	a Gross Ton
One year ago	2.30467c. a Lb.	23.61	a Gross Ton	\$19.17	a Gross Ton

	HIGH	LOW	HIGH	LOW	HIGH	LOW
1943	2.30467c.,	2.30467c.,	\$23.61	\$23.61	\$19.17	\$19.17
1942	2.30467c.,	2.30467c.,	23.61	23.61	19.17	19.17
1941	2.30467c.,	2.30467c.,	\$23.61, Mar. 20	\$23.45, Jan. 2	\$22.00, Jan. 7	\$19.17, Apr. 10
1940	2.30467c., Jan. 2	2.24107c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939	2.35367c., Jan. 3	2.26689c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.58414c., Jan. 4	2.27207c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.58414c., Mar. 9	2.32263c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.67, June 9
1936	2.32263c., Dec. 28	2.05200c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.07642c., Oct. 1	2.06492c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.15367c., Apr. 24	1.95757c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.95578c., Oct. 3	1.75836c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.89196c., July 5	1.83901c., Mar. 1	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.99629c., Jan. 13	1.86586c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.25488c., Jan. 7	1.97319c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.31773c., May 28	2.26498c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Weighted index based on steel bars, beams, tank plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.



How a Woman's War Idea Saved a Year of Man-Hours

MRS. Bonny Smith Lewis, 21-year-old war worker at RCA Manufacturing Company's plant in Indianapolis, had an idea . . . an idea for increasing her company's production of a certain plastic part for military telephone equipment.

The flashing left on this part by the molding process was being removed by hand scraping. Mrs. Lewis' idea was that it could be removed much faster with a wire brushing wheel. The company tried her idea and adopted it.

When the War Production Board conferred awards upon workers whose ideas for improving quality or quantity of war production had proved most valuable they selected 16 men and one woman for top honors. The woman was Mrs. Bonny Smith Lewis. Her idea had saved 2925 man-hours—more than a year's work. In addition, the quality of the product was improved.

Naturally we're proud that the brushes used were made by Osborn. But our tribute here is to America's growing army of women war workers. They've tackled the biggest job they've ever faced. They are doing that job with determination, perseverance and intelligence.

In the final accounting, the contribution of American women to their country's cause will rank with the highest. *The Osborn Manufacturing Company, 5401 Hamilton Avenue, Cleveland, Ohio.*



WORLD'S LARGEST MANUFACTURER
OF BRUSHES FOR INDUSTRY

Prices of Finished Iron and Steel...

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, reductions, and in most cases freight absorbed to meet competition. Delivered prices do not reflect new 3 per cent tax on freight rates.

Basing Point ↓ Product													10 DELIVERED TO		
	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars	Detroit	New York	Philadelphia
SHEETS															
Hot rolled	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.22¢	2.35¢	2.28¢
Cold rolled ¹	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.17¢	3.41¢	3.39¢
Galvanized (24 ga.)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.75¢	3.68¢
Enameling (20 ga.)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.47¢	3.73¢	3.69¢
Long ternes ²	3.80¢		3.80¢									4.55¢		4.18¢	4.14¢
STRIP															
Hot rolled ³	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.22¢	2.48¢	
Cold rolled ⁴	2.80¢	2.90¢		2.80¢			2.80¢		(Worcester = 3.00¢)				2.92¢	3.18¢	
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢							2.58¢	
Commodity C-R	2.95¢			2.95¢			2.95¢		(Worcester = 3.35¢)				3.07¢	3.33¢	
TIN MILL PRODUCTS															
Coke tin plate, base box	\$5.00	\$5.00	\$5.00						\$5.10					5.38¢	5.34¢
Electrolytic tin plate, box	\$4.50		\$4.50												
Black plate, 29 gage ⁵	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢ ¹²			3.39¢
Mfg. ternes, special box	\$4.30	\$4.30	\$4.30						\$4.40						
BARS															
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			(Duluth = 2.25¢)		2.52¢	2.80¢	2.27¢	2.51¢	2.49¢
Rail steel ⁶	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.52¢	2.80¢			
Reinforcing (billet) ⁷	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.52¢	2.55¢ ¹³	2.27¢	2.40¢	
Reinforcing (rail) ⁷	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.52¢	2.55¢ ¹³	2.27¢		2.49¢
Cold finished ⁸	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢			(Detroit = 2.70¢)					3.01¢	2.99¢
Alloy, hot rolled	2.70¢	2.70¢				2.70¢			Bethlehem, Massillon, Canton = 2.70¢				2.82¢		
Alloy, cold drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.47¢		
									(Coatesville and Claymont = 2.10¢)						
PLATES															
Carbon steel	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	2.25¢ ¹¹		2.47¢	2.65¢	2.33¢	2.30¢	2.15¢
Floor plates	3.35¢	3.35¢									3.72¢	4.00¢		3.73¢	3.69¢
Alloy	3.50¢	3.50¢									3.97¢	4.15¢		3.71¢	3.60¢
SHAPES															
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢			(Bethlehem = 2.10¢)		2.47¢	2.75¢		2.28¢	2.22¢
SPRING STEEL, C-R															
0.26 to 0.50 Carbon	2.80¢			2.80¢					(Worcester = 3.00¢)						
0.51 to 0.75 Carbon	4.30¢			4.30¢					(Worcester = 4.50¢)						
0.76 to 1.00 Carbon	6.15¢			6.15¢					(Worcester = 6.35¢)						
1.01 to 1.25 Carbon	8.35¢			8.35¢					(Worcester = 8.55¢)						
WIRE⁹															
Bright ¹⁰	2.60¢	2.60¢		2.60¢	2.60¢				(Worcester = 2.70¢)			3.10¢			2.94¢
Galvanized															
	add proper size extra and galvanized extra to bright wire base, above.														
Spring (High Carbon)	3.20¢	3.20¢		3.20¢					(Worcester = 3.30¢)			3.70¢			3.54¢
PILING															
Steel sheet	2.40¢	2.40¢				2.40¢						2.95¢			2.74¢

¹ Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base. ² Unassorted 8-lb. coating. ³ Widths up to 12 in. ⁴ Carbon 0.25 per cent and less. ⁵ Applies to certain width and length limitations. ⁶ For merchant trade. ⁷ Prices for straight length material only, from a producer to a consumer. Functional discount of 25c. per 100 lb. to fabricators. ⁸ Also shafting. For quantities of 20,000 to 39,999 lb. ⁹ Carload lot to manufacturing trade. ¹⁰ These prices do not apply if the customary means of transportation (rail and water) are not used. ¹¹ Ship plates only. ¹² Boxed. ¹³ Portland and Seattle price, San Francisco price is 2.50c. ¹⁴ This bright wire base price to be used in figuring annealed and bright finish wires, commercial spring wire and galvanized wire.

GOVERNMENT CEILINGS—Price Schedule No. 6 issued April 16, 1941, governs steel mill prices; Price Schedule No. 49 governs warehouse prices, which are on another page of this issue.

EXCEPTIONS TO PRICE SCHEDULE No. 6—On hot rolled carbon bars, Phoenix Iron Co. may quote 2.35c. at established basing points; Calumet Steel division of Borg Warner may quote 2.35c., Chicago, on bars from its 8-in. mill; Joslyn Mfg. Co. may quote 2.35c., Chicago base. On rail steel bars Sweets Steel Co. may quote 2.33c., f.o.b. mill. On hot rolled sheets, Andrews Steel Co. may quote for shipment to Detroit area on Middletown base. On galvanized sheets, Andrews Steel may quote 3.75c., at established basing points. On hot rolled strip, Joslyn Mfg. Co. may quote 2.30c., Chicago base. On plates, Granite City Steel Co. may quote 2.35c., f.o.b. mill, and Central Iron & Steel Co. may quote 2.20c., f.o.b. basing points. On shapes, Phoenix Iron Co. may quote 2.30c. established basing points and 2.50c. Phoenixville for export.

On rail steel merchant bars, Eckels-Nye Corp. may charge 2.40c. On tubing, South Chester Tube Co. may price Gulf or Pacific Coast all-rail shipments and shipments west of Harrisburg on basis of f.o.b. Chester. On lend-lease sales to eastern seaboard, Sheffield Steel Co. and Colorado Fuel & Iron Corp. may sell f.o.b. mill. SEMIFINISHED STEEL—Follansbee Steel Corp. may sell forging billets at \$49.50 f.o.b. Toronto; Continental Steel Corp. may sell Acme Steel Co. at \$34 for rerolling billets plus extras and freight; Ford Motor Co. may sell rerolling billets at \$34 f.o.b. Dearborn; Andrews Steel Co. may sell forging billets at \$50 at established basing points and slabs at \$41; Empire Sheet and Tin Plate may sell slabs at \$41 at established basing points and sheet bars at \$39 f.o.b. mill; on lend-lease sales Northwestern Steel & Wire Co. may charge \$41 per gross ton f.o.b. mill for rerolling billets; on lend-lease sales Wheeling Steel Corp. may charge \$36 per ton for small billets, f.o.b. Portsmouth and \$37 per ton for sheet bars f.o.b. Portsmouth; Laclede Steel Co. on semifinished sales for lend-lease shipped to eastern seaboard may use Chicago basing point prices f.o.b. Alton and Madison, Ill. ALLOY STEEL BARS—Texas Steel Co. may use Chicago base f.o.b. Fort Worth.